

REPORT ON CEPHALOPODS COLLECTED DURING 1906 BY
THE UNITED STATES BUREAU OF FISHERIES STEAMER
"ALBATROSS" IN THE NORTHWESTERN PACIFIC.

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INTRODUCTION.

The zoological collection made by the United States Bureau of Fisheries steamer *Albatross* during her cruise in the northwestern Pacific in 1906 comprised a large number of specimens of cephalopods. This collection throws much light on the faunal knowledge of that region. The specimens were placed by the aforesaid bureau under the charge of Prof. S. Watase, of the Imperial University of Tokyo, who subsequently handed them over to the writer, who in the meantime, while a student in that university, had begun the monographic study of cephalopods. It is a pleasure to express my thanks to Professor Watase for many courtesies during the progress of the work.

The specimens intrusted to me have been duly examined and are referred to sixty species belonging to twenty-nine genera. Of the sixty species eighteen are new to science. These are listed as follows:

Watasella nigra.

Stauroteuthis albatrossi.

Polypus glaber.

Polypus abruptus.

Polypus ochotensis.

Polypus tsugarensis.

Polypus pustulosus.

Polypus spinosus.

Polypus yendoi.

Polypus alatus.

Polypus tenuipulvinus.

Polypus salcbrosus.

Polypus validus.

Rossia mollicella.

Rossia bipapillata.

Sepia carinata.

Gonatopsis octopedatus.

Crystalloteuthis beringiana.

Besides these there are two new varieties, namely, *Polypus macropus*, var. *minor*, and *Sepia kubiensis*, var. *albatrossi*, which are separated from their typical forms for convenience sake, pending a more accurate study based on a greater number of specimens than is accessible to me at present. *Watasella nigra* in the above list is

quite unique in character among cephalopods, though in a few points recalling *Vampyroteuthis infernalis* of Chun, and has obliged the writer to create a new family for it. *Gonatopsis octopedatus* also reveals strong peculiarities, though it has been put under the family Gonatidae. The most remarkable of the peculiarities is the lack of the tentacles, which seems to be well worthy of erecting a new genus for the species.

The species which are reported for the first time from the region under consideration are seven in number, as follows: *Chunella diaphana* (Hoyle), *Scaerurgus patagiatus* Berry, *Mastigoteuthis cordiformis* Chun, *Galiteuthis armata* Joubin, *Taonius puvo* (Lesueur), *Megalocranchia maxima* Pfeffer, and *Liocranchia valdiviæ* Chun.

The following is the list of the stations of the dredging operations, showing their position, depth, date, and the species obtained at each:

- Station 4760: 53° 53' N.; 144° 53' W.; 2,200 fathoms; May 21.....*Gonatus fabricii*.
 Station 4763: 53° 46' N.; 164° 29' W.; 56 fathoms; May 28.....*Gonatus fabricii*.
 Station 4765: 53° 12' N.; 171° 37' W.; 1,217 fathoms; }*Gonatus fabricii*.
 May 29. }*Crystalloteuthis beringiana*.
 Station 4768: 54° 20' 30'' N.; 179° 09' 30'' E.; 764 fathoms; June 3.*Galiteuthis armata*.
 Station 4769: 54° 30' 40'' N.; 179° 14' E.; 244 fathoms; June 3....*Gonatus fabricii*.
 Station 4771: 54° 30' N.; 179° 17' E.; 426 fathoms; June 4...*Stawroteuthis albatrossi*.
 Station 4772: 54° 30' 30'' N.; 179° 14' E.; 372 fathoms; June 4....*Gonatus fabricii*.
 Station 4774: 54° 33' N.; 178° 45' E.; 557 fathoms; June 4.....*Gonatus magister*.
 Station 4775: 54° 33' 30'' N.; 178° 44' E.; 584 fathoms; June 4... }*Gonatus fabricii*.
 }*Polypus januarii*.
 Station 4783: 52° 55' 30'' N.; 173° 30' E.; 59 fathoms; June 9.
Crystalloteuthis beringiana.
 Station 4784: 52° 55' 40'' N.; 173° 26' E.; 135 fathoms; June 11.....*Rossia pacifica*.
 Station: Medni Island; June 13.....*Polypus punctatus*.
 Station 4794: 54° 48' N.; 164° 54' E.; 2,700 fathoms; June }*Polypus punctatus*.
 16, }*Gonatus fabricii*.
 }*Crystalloteuthis beringiana*.
 Station 4796: 52° 47' N.; 158° 43' E.; 48 fathoms; June 20.....*Polypus punctatus*.
 Station 4797: 52° 37' 30'' N.; 158° 50' E.; 682 fathoms; June 20...*Galiteuthis armata*.
 Station: Milne Bay, Simushir Island; June 23.....*Gonatus fabricii*.
 Station 4803: 46° 42' N.; 151° 45' E.; 229 fathoms; June 24.....*Polypus punctatus*.
 Station 4806: 42° 13' N.; 144° 21' E.; June 26.....*Crystalloteuthis beringiana*.
 Station: Hakodate Bay; surface light; June 30, July 12..... }*Idiosepius pygmaeus*.
 }*Euprymna similis*.
 }*Loligo japonica*.
 }*Sepia andreana*.
 Station: Hakodate market; July 1, 2..... }*Loligo japonica*.
 }*Sepia andreana*.
 }*Euprymna similis*.
 }*Ommastrephes sloani pacificus*.
 Station 4807: 41° 36' 12'' N.; 140° 36' E.; 44 fathoms; July 16... }*Polypus spinosus*.
 }*Sepiolo birostrata*.
 Station 4808: 41° 35' 50'' N.; 140° 36' 45'' E.; 47 fathoms; July 16.
Polypus conispadicus.

- Station 4809: 41° 18' N.; 140° 08' 40'' E.; 207 fathoms; July 16... *Polypus spinosus*.
- Station 4810: 41° 17' 20'' N.; 140° 07' E.; 195 fathoms; July 16. {*Rossia pacifica*.
Polypus tsugarensis.
- Station 4812: 38° 33' N.; 138° 40' E.; 176 fathoms; July 18..... *Rossia pacifica*.
- Station 4813: 38° 35' N.; 138° 41' E.; 200 fathoms; July 18..... *Rossia pacifica*.
- Station 4817: 38° 12' N.; 138° 52' E.; 61 fathoms; July 18..... *Polypus fung-siao*.
- Station: Sado Island; surface; date unknown..... {*Ommastrephes sloani pacificus*.
Sepiolo birostrata.
- Station: Ebisu Market, Sado Island; July 19..... *Ommastrephes sloani pacificus*.
- Station 4822: 37° 08' 10'' N.; 137° 08' E.; 130 fathoms; July 21..... *Rossia pacifica*.
- Station 4826: 37° 25' N.; 137° 32' E.; 545 fathoms; July 21..... *Rossia pacifica*.
- Station 4828: 37° 23' N.; 137° 36' E.; 163 fathoms; July 21..... *Rossia pacifica*.
- Station 4829: 37° 20' N.; 137° 41' 30'' E.; 527 fathoms; July 22. *Watasenia scintillans*.
- Station 4834: 36° 03' 30'' N.; 135° 54' E.; 130 fathoms; July 23... {*Rossia pacifica*.
Sepiolo birostrata.
- Station 4835: 36° 03' 30'' N.; 135° 52' 30'' E.; 134 fathoms; July 23 {*Rossia pacifica*.
Sepiolo birostrata.
- Station 4838: 35° 56' 30'' N.; 153° 39' 15'' E.; 144 fathoms; July 24 {*Rossia pacifica*.
Sepiolo birostrata.
- Station 4839: 35° 57' 45'' N.; 135° 34' E.; 140 fathoms; July 24. *Sepiolo birostrata*.
- Station: Tsuruga, Tango Province; shore; July 24..... {*Sepia esculenta*.
Sepia kobeiensis.
- Station 4843: 36° 29' 20'' N.; 133° 01' 20'' E.; 100 fathoms; July 26 {*Rossia pacifica*.
Sepiolo birostrata.
- Station 4844: 36° 34' N.; 132° 50' 20'' E.; 116 fathoms; July 26.. {*Rossia pacifica*.
Sepiolo birostrata.
- Station 4845: 36° 43' 30'' N.; 132° 23' 30'' E.; 550 fathoms; July 26.
Ommastrephes sloani pacificus.
- Station 4852: 36° 06' 30'' N.; 129° 50' E.; 568 fathoms; July 30.
Ommastrephes sloani pacificus.
- Station 4853: 36° 08' N.; 129° 49' E.; 400 fathoms; July 30..... *Gonatus magister*.
- Station 4855: 36° 01' 30'' N.; 129° 42' E.; 70 fathoms; {*Watasenia scintillans*.
 July 30..... {*Ommastrephes sloani pacificus*.
Rossia pacifica.
- Station 4856: 36° 08' N.; 129° 47' E.; 300 fathoms; July 30... *Watasenia scintillans*.
- Station 4858: 36° 17' N.; 129° 40' E.; 67 fathoms; July 31..... *Rossia pacifica*.
- Station 4859: 36° 17' N.; 129° 41' E.; 93 fathoms; July 31... {*Watasenia scintillans*.
Rossia pacifica.
- Station 4860: 36° 18' N.; 129° 44' E.; 122 fathoms; July 31..... *Rossia pacifica*.
- Station 4867: 36° 31' N.; 129° 46' E.; 150 fathoms; Aug. 1.... *Watasenia scintillans*.
- Station 4868: 36° 32' N.; 129° 45' E.; 150 fathoms; Aug. 1..... {*Polypus punctatus*.
Rossia pacifica.
Sepiolo birostrata.
- Station 4869: 36° 30' N.; 129° 42' E.; 94 fathoms; Aug. 1..... *Rossia pacifica*.
- Station 4870: 36° 30' 30'' N.; 129° 43' E.; 60 fathoms; Aug. 1..... *Rossia pacifica*.
- Station 4871: 36° 29' 30'' N.; 126° 43' 30'' E.; 60 fathoms; Aug. 1... *Rossia pacifica*.
- Station 4872: 34° 38' 30'' N.; 129° 59' E.; 66 fathoms; Aug. 2.. {*Polypus macroopus*.
Loligo bleekeri.
- Station 4873: 34° 38' N.; 130° E.; 66 fathoms; Aug. 2..... *Loligo bleekeri*.
- Station 4874: 34° 38' N.; 130° 03' E.; 66 fathoms; Aug. 2..... *Sepia kobeiensis*.
- Station 4875: 34° 19' N.; 130° 09' E.; 59 fathoms; {*Sepia appellofi*.
 Aug. 2..... {*Sepia kobeiensis*, var. *albatrossi*.
- Station 4876: 34° 20' N.; 130° 10' E.; 59 fathoms; Aug. 2..... {*Sepia elliptica*.
Sepia kobeiensis.

- Station 4878: 34° 18' 30'' N.; 130° 14' 30'' E.; 59 fathoms; Aug. 2.
Sepia kobiensis, var. *albatrossi*.
- Station: Shimonoseki; date unknown. *Polypus macropus*.
- Station: Nagasaki; from fisherman; Aug. 5. *Polypus macropus*.
- Station 4883: 32° 33' 30'' N.; 129° 32' E.; 53 fathoms; Aug. 8. *Sepia kobiensis*.
- Station 4884: 32° 32' N.; 129° 30' 45'' E.; 53 fathoms; Aug. 8. {*Sepia appellöfi*.
Sepia kobiensis.
- Station 4885: 32° 31' 30'' N.; 129° 30' 15'' E.; 53 fathoms; Aug. 8. {*Sepia kobiensis*.
Sepia appellöfi.
- Station 4903: 32° 31' 10'' N.; 128° 33' 20'' E.; 139 fathoms; Aug. 10,
Sepiolina nipponensis.
- Station 4906: 31° 39' N.; 129° 20' 30'' E.; 406 fathoms; Aug. 11. {*Chiroteuthis (Chirothauma) imperator*.
Taonius pavo.
- Station: Akune, Satsuma Province; date unknown. {*Polypus parvus*.
Sepia kobiensis.
- Station 4912: 31° 39' 40'' N.; 129° 30' E.; 391 fathoms; Aug. 12,
Opisthoteuthis depressa.
- Station 4915: 31° 31' N.; 129° 25' 30'' E.; 424 fathoms; Aug. 12. *Polypus validus*.
- Station 4917: 30° 24' N.; 129° 06' E.; 361 fathoms; Aug. 13,
Megalocranchia maxima.
- Station 4919: 30° 34' N.; 129° 19' 30'' E.; 440 fathoms; Aug. 13,
Opisthoteuthis depressa.
- Station 4924: 30° 5' N.; 130° 21' 20'' E.; 159 fathoms; Aug. 14. *Scaergus patagiatus*.
- Station 4930: 30° 12' N.; 130° 44' E.; 84 fathoms; Aug. 15. *Sepia misakiensis*.
- Station 4931: 30° 12' N.; 130° 43' 40'' E.; 83 fathoms; Aug. 15,
Sepia kobiensis, var. *albatrossi*.
- Station 4933: 30° 59' N.; 130° 29' 50'' E.; 152 fathoms; Aug. 16. *Sepia appellöfi*.
- Station 4937: 31° 13' N.; 130° 43' 10'' E.; 58 fathoms; Aug. 16. *Sepia kobiensis*.
- Station 4938: 31° 16' 45'' N.; 130° 43' 40'' E.; 70 fathoms; Aug. 16. {*Sepia elliptica*.
Sepia kobiensis.
- Station 4940: 31° 22' 10'' N.; 130° 40' 10'' E.; 115 fathoms; Aug. 17,
Sepiolina nipponensis.
- Station 4941: 31° 22' 10'' N.; 130° 39' 20'' E.; 117 fathoms; Aug. 17. {*Sepiolina nipponensis*.
Polypus macropus.
- Station 4942: 31° 23' 10'' N.; 130° 39' 10'' E.; 118 fathoms; Aug. 17. {*Sepiolina nipponensis*.
Polypus macropus.
- Station 4943: 31° 24' 35'' N.; 130° 38' 40'' E.; 119 fathoms;
 Aug. 17, *Sepiolina nipponensis*.
- Station 4946: 31° 29' 10'' N.; 130° 34' 30'' E.; 39 fathoms; Aug. 20. *Sepia kobiensis*.
- Station 4951: 31° 10' 30'' N.; 131° 58' 30'' E.; 703 fathoms; Aug. 21,
Chiroteuthis (Chirothauma) imperator.
- Station 4952: 31° 19' N.; 132° 11' 30'' E.; 700 fathoms; Aug. 21. {*Argonauta böttgeri*.
 (? *Ommastrephes sloani pacificus*).
- Station 4956: 32° 32' N.; 130° 25' E.; 720 fathoms; Aug. 23. *Chunella diaphana*
- Station 4957: 32° 36' N.; 132° 23' E.; 437 fathoms; Aug. 23. {*Enoplateuthis chunii*.
Polypus januarii.
Polypus punctatus.
Polypus alatus.
- Station 4960: 32° 34' N.; 132° 21' 45'' E.; 578 fathoms; Aug. 23,
Thelidioteuthis alessandrini.
- Station 4961: 24° 09' 15'' N.; 134° 56' 40'' E.; 33 fathoms; Aug. 27. *Sepia peterseni*.
- Station 4963: 34° 06' 15'' N.; 134° 57' 50'' E.; 40 fathoms; Aug. 27. {*Loligo edulis*.
Sepia peterseni.
- Station 4967: 33° 25' 10'' N.; 135° 37' 20'' E.; 244 fathoms; Aug. 29. *Rossia mollicella*.
- Station 4969: 33° 23' 40'' N.; 135° 33' E.; 587 fathoms; Aug. 29. {*Opisthoteuthis depressa*.
Polypus abruptus.

- Station 4970: 33° 23' 30'' N.; 135° 36' 30'' E.; 500 fathoms; Aug. 30,
Liocranchia valdiviae.
- Station 4972: 33° 25' 45'' N.; 135° 33' E.; 440 fathoms; Aug. 30....*Rossia mollicella*.
- Station 4973: 33° 24' 15'' N.; 135° 30' 30'' E.; 600 fathoms; Aug. 30...*Polypus januarii*.
- Station 4977: 33° 23' N.; 135° 37' 40'' E.; 544 fathoms; Aug. 31.....*Watasella nigra*.
- Station 4983: 43° 01' 35'' N.; 140° 10' 40'' E.; 425 fathoms; Sept. 19.*Gonatus magister*.
- Station 4989: 43° 23' 10'' N.; 140° 37' E.; 92 fathoms; Sept. 20.....*Rossia pacifica*.
- Station 4993: 45° 25' 30'' N.; 140° 53' E.; 142 fathoms; Sept. 21.....*Rossia pacifica*.
- Station 4994: 45° 27' 50'' N.; 140° 54' E.; 190 fathoms; Sept. 22.....*Rossia pacifica*.
- Station 5005: 46° 04' 40'' N.; 142° 27' 30'' E.; 42 fathoms; Sept. 24.*Polypus macropus*.
- Station 5010: 46° 30' 30'' N.; 142° 43' 30'' E.; 21 fathoms; Sept. 24...*Rossia pacifica*.
- Station 5023: 48° 43' 30'' N.; 145° 03' E.; 75 fathoms; Sept. 27...*Polypus ochotensis*.
- Station 5026: 48° 36' 10'' N.; 145° 17' 30'' E.; 119 fathoms; Sept. 28.*Polypus ochotensis*.
- Station 5029: 48° 22' 30'' N.; 145° 43' 30'' E.; 440 fathoms; Sept. 28. {*Gonatopsis octopedatus*.
Stauroteuthis albatrossi.
Polypus salebrosus.
- Station 5030: 46° 29' 30'' N.; 145° 46' E.; 1,800 fathoms; Sept. 29,
Crystalloteuthis beringiana.
- Station 5031: 44° 04' N.; 145° 32' E.; 86 fathoms; Sept. 30..... {*Rossia pacifica*.
Sepiolo birostrata.
- Station 5032: 44° 05' N.; 145° 30' E.; 300 fathoms; Sept. 30.....*Sepiolo birostrata*.
- Station 5042: 42° 17' 30'' N.; 142° 07' 30'' E.; 61 fathoms; Oct. 3...*Rossia pacifica*.
- Station 5044: 42° 10' 40'' N.; 142° 14' E.; 309 fathoms; Oct. 3.....*Polypus glaber*.
- Station 5045: 42° 11' 10'' N.; 142° 12' E.; 359 fathoms; Oct. 3.....*Polypus glaber*.
- Station 5046: 38° 15' 07'' N.; 141° 44' 20'' E.; 82 fathoms; Oct. 10.*Sepiolo birostrata*.
- Station 5047: 38° 12' 50'' N.; 141° 49' 15'' E.; 107 fathoms; Oct. 10. {*Rossia pacifica*.
Sepiolo birostrata.
- Station 5048: 38° 09' 24'' N.; 141° 52' 30'' E.; 129 fathoms; Oct. 10. {*Watasenia scintillans*.
Rossia pacifica.
Sepiolo birostrata.
- Station 5049: 38° 12' N.; 142° 02' E.; 182 fathoms; Oct. 10.....*Watasenia scintillans*.
- Station 5050: 38° 11' 30'' N.; 142° 08' E.; 266 fathoms; Oct. 10. {*Stauroteuthis albatrossi*.
Polypus glaber.
Polypus salebrosus.
Sepiolo birostrata.
- Station 5051: 38° 11' N.; 142° 12' E.; 399 fathoms; Oct. 10.....*Rossia mollicella*.
- Station 5053: 34° 49' 20'' N.; 138° 40' 15'' E.; 503 fathoms; Oct. 12...*Polypus glaber*.
- Station 5055: 34° 53' N.; 138° 44' 15'' E.; 124 fathoms; Oct. 12.*Sepiolina nipponensis*.
- Station 5060: 35° 06' N.; 138° 40' 10'' E.; 197 fathoms; Oct. 13.
Mastigoteuthis cordiformis.
- Station: Shimizu, Suruga Province; shore; Oct. 14 {*Euprymna morsei*.
Sepia kubiensis.
Polypus macropus.
- Station: Shimizuminato; Oct. 15.....*Polypus parvus*.
- Station 5069: 35° 03' 10'' N.; 138° 47' E.; 131 fathoms; Oct. 15. {*Rossia bipapillata*.
Sepiolina nipponensis.
- Station 5074: 34° 40' 45'' N.; 138° 18' 30'' E.; 47 fathoms; Oct. 16.
Polypus macropus, var. *minor*.
- Station 5081: 34° 15' N.; 138° 05' E.; 500 fathoms; Oct. 19.....*Argonauta hians*.
- Station 5082: 34° 05' N.; 137° 59' E.; 662 fathoms; Oct. 20...*Stigmatoteuthis dofleini*.
- Station 5084: 34° N.; 137° 49' 40'' E.; 918 fathoms; Oct. 20...*Stauroteuthis albatrossi*.
- Station 5092: 35° 04' 50'' N.; 139° 38' 18'' E.; 70 fathoms; Oct. 26. {*Opisthoteuthis depressa*.
Polypus pustulosus.
Polypus tenuipulvinus.
Sepia carinata.
- Station 5094: 35° 04' 42'' N.; 139° 38' 20'' E.; 88 fathoms; Oct. 26....*Sepia carinata*.
- Station 5095: 35° 05' 34'' N.; 139° 38' 36'' E.; 58 fathoms; Oct. 26... {*Sepia kubiensis*.
Sepia appellöfi.

DESCRIPTION OF SPECIES.

Suborder OCTOPODA Leach.

Division LIOGLOSSA Lütken.

WATASELLIDAE, new family.

WATASELLA, new genus.

1. WATASELLA NIGRA, new species.

Plate 23, fig. 1.

Station 4977 (off Kii Province). One specimen.

Animal soft, choroidal, translucent, covered by a flabby and smooth skin throughout. Mantle thick, saccular, a little longer than broad, widest anteriorly, rounded posteriorly. Mantle-opening wide, extending half round the body. Fins, two pairs in number, those of each pair attached side by side to the dorso-lateral surface of the mantle much nearer to its posterior end than to the anterior margin; the line of attachment being longitudinal. Transverse length of fins equal to about twice their breadth and a quarter of the length of the mantle.

Head large, subcylindrical, as broad as the body, with no constriction in front or behind. Eyeball dark violet in color, opening on the exterior through a large orifice. Tuberculus olfactorius of pink color, present on each side of the neck region a little before and below each angle of mantle-opening.

Arms subequal, on an average about as long as the head and mantle taken together; cylindrical in the proximal half, then tapering distad to the attenuated extremities. Umbrella thick, broad, extending half way up the arms, apparently without nodule at the termination of its attachment. The suckers number ten or more in each arm, set uniserially on its distal half; globular but depressed at the distal end, which has a minute aperture at the center; deeply constricted at base so that they approach in appearance the pedunculate suckers of decapods. Cirri biserial, alternating with the suckers, but ten or twelve more are found proximal to the first sucker on each arm.

A tubular pouch exists between the first and second arms on either side, running radially through the umbrella, and opening externally on the umbrella edge. The pouch has a filamentous organ growing from its blind end.

Beak strong, very large. Radula not examined.

Color of inner surface of umbrella in formalin, quite black; external surfaces of all parts apparently also of the same color, except the mantle edge, which is of reddish hue. Tuberculus olfactorius, inner and outer lips, the distal part of suckers and cirri all of a light crimson.

Total length 25 mm.; ventral length of mantle 8.3 mm.

Type.—Cat. No. 332892, U.S.N.M.

Family CIRROTEUTHIDAE Keferstein.

Genus STAUROTEUTHIS Verrill.

Plate 23, figs. 2, 3.

2. STAUROTEUTHIS ALBATROSSI, new species.

Station 4771 (Bering Sea). One female. Cat. No. 332950, U.S.N.M.

Station 5029 (Okhotsk Sea). One young female. Cat. No. 332951, U.S.N.M.

Station 5050 (off Kinka-san). One male. Cat. No. 332949, U.S.N.M.

Station 5084 (off Totomi Prov.). One female. Cat. No. 332948, U.S.N.M.

Animal very soft, choroidal, flabby, bell-shaped, without clear outward demarkations between head, body, and arms. Body hemispherical, quite rounded behind and never flattened. Mantle opening very narrow, crescentiform, its margin fitting closely around the tubular part of the funnel. Fins transverse-ovate with their antero-distal margin rounded, and their posterior margin nearly straight; attached to the dorso-lateral surface of the mantle to a little in front of half their length. Length of fins two-thirds their width.

Head broader than body. Eyes full, diameter of eyeball one-third of the breadth of the head. Tuberculus olfactorius present on the base of the funnel near each angle of the mantle-cavity. Funnel sunk deeply in the mantle-cavity. Umbrella very broad, as thick as the arms; radii about equally long but those between the first arms and between the first and second arms a little longer than those of the other interbrachial spaces, measuring over half the length of these arms.

Arms soft, greatly elastic, seemingly about uniform, and about twice as long as the head and body taken together. Suckers 70-90 in each arm; uniserial. They begin with a minute sucker at the base of the arms, becoming quickly larger to the six or seventh, then very gradually diminishing in size toward the extremity. Cirri in two opposite series, alternating regularly with the suckers, beginning proximally between first and second suckers. Both dorsal arms hectocotylized, provided with three very conspicuous suckers halfway along their length.

Dorsal cartilage U-shaped; the horns turning cephalad and tapering to sharp points; the middle part transverse, forming an obtuse angle in the middle. Section of the cartilage crescentic, the convexity turning anteriorly and internally. Concave posterior surface of each horn separated from that of the middle part by a vertical ridge.

Inner surfaces of umbrella and arms colored deep purple, which sometimes deepens into quite black, but the suckers are always of

a little lighter tint and more reddish. External surface of all parts appears light reddish brown in color.

Ink-gland absent. Gills massive, each with eight lobular leaflets. Oviduct and water vascular canal both single, namely those of the left side. Vagina stout, projecting freely into mantle-cavity. Mature ovarian eggs 10 mm. long.

Total length 40–200 mm.

Type-locality.—Off Kinka-san, Rikuzen Province.

Type.—Cat. No. 332949, U.S.N.M.

Genus OPISTHOTEUTHIS Verrill.

3. OPISTHOTEUTHIS DEPRESSA Ijima and Ikeda.

Opisthoteuthis depressa IJIMA and IKEDA, Journ. Coll. Sci. Imp. Univ. Tokyo, vol. 8, 1895, pp. 1–15, pl. 33.—MEYER, Zool. Anz., vol. 29, 1906, pp. 758–760; Zeitsch. wiss. Zool., vol. 75, 1906, pp. 183–269, pls. 11–16.—MARCHAND, Zeitsch. wiss. Zool., vol. 86, 1907, p. 381.—DOLLO, Zool. Jahrb. Suppl., vol. 15, 1912, pp. 131, etc., pl. 3, fig. 5.

Station 4912 (off Satsuma Prov.). Two females. Cat. No. 332941, U.S.N.M.

Station 4969 (off Kii Prov.). One female. Cat. No. 332943, U.S.N.M.

Station 4919 (off Kusakaki-jima). One female. Cat. No. 332942, U.S.N.M.

Station 5092 (Sagami Sea). One female. Cat. No. 332940, U.S.N.M.

The specimens listed above are, without hesitation, referred to the present species; they are not, however, so much flattened as described by Ijima and Ikeda but show a concavo-convex curvature or even a shallowly urceolate structure, approaching *Stauroteuthis* in shape, and the dorsal cartilage is not straight, but bent into a crescent.

Division TRACHYGLOSSA Lütken.

Family ELEDONELLIDAE, new name.

Bolitaenidae CHUN, Cirrothauma, 1911, p. 20.—NAEF, Teutholog. Notiz., vol. 8, 1912, p. 196.—BERRY, Hawaiian Cephalopoda, 1914, p. 289.

Genus CHUNELLA, new name.

Bolitaena CHUN, Cirrothauma, 1911, p. 17.

Japettella (part) HOYLE, Ann. Mag. Nat. Hist., ser. 5, vol. 15, 1885, p. 232.

Eledonella HOYLE, Challenger Cephalopoda, 1886, p. 106.

Chun (1911) mentions a specimen caught by the *Valdivia* under the name of *Bolitaena diaphana*, identifying it with *Eledonella diaphana* (Hoyle), without giving any explanation for the reason why he refers it to the genus *Bolitaena*. Judging from Steenstrup's description reproduced in Hoyle (1886, p. 16), that genus seems closely related to *Alloposus*, a quite different genus from Verrill's *Eledonella* (not Hoyle's).

Type.—*Chunella diaphana* (Hoyle), 1885.

4. CHUNELLA DIAPHANA (Hoyle).

Japetella diaphana HOYLE, Ann. Mag. Nat. Hist., ser. 5, vol. 15, 1885, p. 232.
Eledonella diaphana HOYLE, Challenger Cephalopoda, 1886, p. 107, pl. 9, figs. 3-6.—
 JOUBIN, Princess-Alice Cephalopoda, 1900, p. 37, pl. 2, figs. 5-7.—HOYLE,
Albatross Cephalopoda, 1904, p. 22, pl. 5, fig. 11.
Bolitaena diaphana CHUN, Cirrothauma, 1911, pp. 15-20; figs. 7, 8.

Station 4956 (off Kii Province). An immature specimen. Cat. No. 332924, U.S.N.M.

This specimen agrees well with Hoyle's description. As compared with Chun's illustration the optic ganglion is a little too broad, and the optic nerve slender, but no difference otherwise could be made out.

Family ARGONAUTIDAE Cantraine.

Subfamily ARGONAUTINAE Berry.

Genus ARGONAUTA Linnaeus.

5. ARGONAUTA HIANS Solander.

Argonauta hians FÉRUSSAC and D'ORBIGNY, Céphalopodes acétabulifères, 1838, p. 174, pl. 5.—GRAY, British Museum, 1849, p. 33.—TRYON, Manual Conchology, vol. 1, 1879, p. 136, pl. 46, figs. 100-102.—ORTMANN, Japanische Cephalopoden, 1888, p. 641.—HOYLE, *Albatross* Cephalopoda, 1904, p. 11.

Station 5081 (Yenshu-nada). One young female. Cat. No. 332952, U.S.N.M.

6. ARGONAUTA BÖTTGERI Maltzan.

Argonauta böttgeri SMITH, Ann. Mag. Nat. Hist., ser. 5, vol. 21, 1887, p. 409, pl. 17, figs. 1-6.—DALL, *Albatross* Report, 1908, pp. 226, 229.—BERRY, Hawaiian Cephalopoda, 1914, pp. 277-280, textfigs 3-7, pl. 48, fig. 5.—MASSY, Antarctic Expedition Report, 1916, p. 143, textfigs. 1, 2.

Station 4952 (east of Osumi Prov.). Two females. Cat. No. 332953, U.S.N.M.

Of the said two specimens the larger approaches *A. hians* in that the ribs of the shell are relatively few, and the granules on its sides comparatively rare. As compared with Berry's illustration, the pads of the funnel organ are narrower. The smaller specimen is very small, the shell measuring only 25 mm. in length, yet it bears already egg-clusters within the shell; which seems to be a characteristic of the species so far as I have been able to ascertain.

Family POLYPODIDAE Hoyle.

Genus POLYPUS Schneider.

7. POLYPUS PAVUS Sasaki.

Polypus parvus SASAKI, Annot. Zool. Japon., vol. 9, 1917, p. 365.

Station Akune, Satsuma. One female. Cat. No. 332964, U.S.N.M.

Station Shimizuminato. Two females and males. Cat. 332965, U.S.N.M.

These specimens are all fully mature and measure 110–145 mm. in length. They agree in every respect with the original specimens, and there is no need to add further details to what has been said about the species.

8. POLYPUS FANG-SIAO (d'Orbigny).

Octopus fang-siao D'ORBIGNY, in Férussac and d'Orbigny, Céphalopods acétabulifères, 1838, p. 71.

(?) *Octopus areolatus* DE HAAN MS. in Férussac and d'Orbigny, Céphalopodes acétabulifères, 1838, p. 65.

Octopus ocellatus GRAY, Brit. Mus. Cat., 1849, p. 15.—JOURNIN, Notes Leyden Museum, vol. 20, 1898, p. 22.

Polypus areolatus (part) WÜLKER, Doflein Beitr. Naturgesch. Ostasiens, 1910, p. 6.—Berry, Japanese Cephalopoda, 1912, p. 333.

Station 4817 (off Niigata). Two juvenile specimens. Cat. No. 332966, U.S.N.M.

These two specimens measure 6 mm. and 4.5 mm. in mantle-length respectively. For such young, they show already the characteristic ocellar patch in front and below each eye and the elongated patch above the head between the eyes. The five circumorbital cirri are also well discernible.

9. POLYPUS JANUARI (Steenstrup).

Octopus januarii HOYLE, Challenger Cephalopoda, 1886, p. 97, pl. 7, figs. 1–4.—GOODRICH, Calcutta Museum Collection Report, 1896, p. 19.

Polypus januarii HOYLE, Albatross Cephalopoda, 1904, p. 18, pl. 5, fig. 2.—BERRY, Japanese Cephalopoda, 1912, p. 392.

Station 4775 (Aleutian Island). One young female. Cat. No. 332974, U.S.N.M.

Station 4957 (Bungo-suido). One female, badly mutilated. Cat. No. 332975, U.S.N.M.

Station 4973 (off Kii Province). One young female. Cat. No. 332973, U.S.N.M.

The specimens alluded to seem to me properly referable to the present species. But their heads are by no means as small as stated by Hoyle (1886), being as broad, or even broader, than the body. In other respects they differ from his illustration (1904); as for instance, the inner lateral teeth of the radula have a broad base and a faint blunt cusp on the inner side in addition to the sharp ordinary cusp on the outer.

10. POLYPUS GLABER, new species.

Station 5044 (Hokkaido). One young female. Cat. No. 332980, U.S.N.M.

Station 5045 (Hokkaido). One young male. Cat. No. 332981, U.S.N.M.

Station 5050 (off Kinka-san). One young female. Cat. No. 332982, U.S.N.M.

Station 5053 (Suruga Bay). One young female. Cat. No. 332983, U.S.N.M.

Skin more or less choroidal in consistency, quite smooth throughout, even around eyes. Body slightly broader than long, expanded posteriorly, provided with a shallow median groove on the belly, and a distinct horizontal ridge around the periphery. Mantle opening narrow.

Head slightly narrower than body; neck quite feebly constricted. Funnel organ W-shaped, its median \wedge -shaped part twice as long as the outer limbs. Umbrella rather narrow, of nearly equal breadth all round.

Arms subequal, the formula of length being $1 > 2 > 3 = 4$; longest pair three to four times as long as body. Suckers small, arranged in two well-defined rows, except three or four at the base of the arms, which are in a zigzag row. The ninth or tenth sucker is the largest though not specially enlarged. Right third arm hectocotylized, a little shorter than the left third; terminal organ $\frac{1}{20}$ the entire length, subfusiform, provided with narrow but well-defined copulatory groove and about 22 distinct transverse streaks; suckers 52 pairs on the normal part.

Penis rather small, its posterior half bent almost into the shape of a C, the anterior origin of which is connected with L-shaped Needham's sac. Vaginae and oviducts proper, both nearly straight, the former terminating far behind the anus.

Gill composed of 23 or 24 leaflets. Caecum of stomach spherical, but little flattened dorsoventrally and slightly involute. No ink-gland present.

Total length, 245 mm. in male, 155–185 mm. in female.

Type locality.—Off Hidaka Province, Hokkaido.

Type.—Cat. No. 332981, U.S.N.M.

11. POLYPUS ABRUPTUS, new species.

Station 4969 (off Kii Province). One male and female. Cat. No. 332935, U.S.N.M.

Surface quite smooth, rather firm to the touch. Body as long as, or longer than, broad; without distinct horizontal ridge along the periphery. Mantle opening of moderate breadth.

Head a little narrower than body, separated from it by a weak constriction. Umbrella broad, equally developed all around, extending about a quarter up the arms to the fourteenth or fifteenth pair of suckers, then continuing on as a rather broad contractile membrane along the ventral side of the arms to the extremity. Funnel organ conspicuous, situated in the middle of dorsal funnel-wall, W-shaped, the outer limbs half as long as the \wedge -shaped central part.

Arms subequal, the formula of length being $1 > 2 = 3 = 4$; first pair about four times as long as the head and body taken together. Suckers

85-90 pairs on each arm, closely set in two well-defined rows excepting several at base which are sparsely arranged in one zigzag, or two alternating rows. They are very unequal in size and increase rapidly to the fourteenth or fifteenth pair on each arm, beginning with a minute sucker at base. The fifteenth to the seventeenth pair which are opposite to the umbrella edge, are markedly enlarged, and succeeded by several pairs of quickly diminishing suckers; beyond these they become smaller very gradually and uniformly toward the extremity.

Right third arm hectocotylized, about four-fifths as long as the left third; terminal organ slender conic, occupying one-thirteenth of the entire length and provided with a distinct copulatory groove. Suckers on the normal part 57 pairs.

Gill composed of 21-23 branchial leaflets.

Penis fusiform, 25 mm. long, connected with the duct of Needham's sac at a point one-third the length from the distal end. Spermatophores about 90 mm. long.

Vaginae thick, short terminating far behind the anus.

Total length 52 cm. in male, 39 cm. female.

Type.—Cat. No. 332935a, U.S.N.M.

12. POLYPUS OCHOTENSIS, new species.

Station 5023 (near Cape Patience, Okhotsk Sea). One female. Cat. No. 332955, U.S.N.M.

Station 5026 (Taraika Bay). One young male. Cat. No. 332956, U.S.N.M.

Superficial texture loose, soft and flabby. Surface quite smooth, or with a few warts. Three unequal cirri are present above each eye. Body globose, as long as wide, provided with a distinct horizontal ridge around periphery, but with no median groove on belly. Mantle opening of moderate width.

Head large. Neck constriction not marked. Umbrella well-developed, extending $\frac{1}{3}$ - $\frac{1}{4}$ up the arms and thereafter continued as a narrow contractile membrane along the ventral side to the extremity. Funnel incorporated with head excepting a short conical extremity. Funnel organ W-shaped, the \wedge -shaped middle part slightly longer than twice the length of outer limbs.

Arms nearly uniform in length and a little longer than three times the mantle length. Suckers rather small, arranged in two well-defined rows excepting the first three or four which are in a zigzag row. None of suckers specially enlarged. Right third arm hectocotylized, its terminal organ $\frac{2}{3}$ the entire length; suckers on the normal part 42 pairs.

Gill composed of 18 or 19 leaflets. Ink gland present. Ovary markedly expanded sideways, its eggs about 9 mm. long, numbering 33. Oviducts proper situated to the right of their usual position.

Vaginae very thick, short, terminating far behind the anus. Penis only 5 mm. long, spindle-shaped, the swollen middle part connected with Needham's sac.

Total length 190 mm. in female, about 95 mm. in male.

Type locality.—Near Cape Patience, Okhotsk Sea.

Type.—Cat. No. 332955, U.S.N.M.

13. POLYPUS TSUGARENSIS, new species.

Plate 23, fig. 4.

Station 4810 (Tsugaru Strait). One mature male. Cat. No. 332972, U.S.N.M.

Animal fleshy, very firm to the touch. Surface smooth excepting a number of faint warts irregularly distributed about the eyes. A laterally flattened cirrus is present above each eye. Body compact, broader than long, expanded posteriorly. Mantle opening of moderate width.

Head a little narrower than body. Neck constriction weak. Umbrella well developed, especially between the first and second arms as well as between the lateral arms, where it extends more than a quarter up the arms. Funnel rather long. Funnel organ half as long as the distance between the anus and the end of the funnel, situated much nearer to the former than to the latter; trilobate, the lobes all triangular, sharply pointed distally, turning cephalad, and the median lobe decidedly longer than the remaining two. Posterior margin of the organ with a small triangular indentation in the middle.

Arms nearly equal, about four times as long as the body. Suckers arranged in two well-defined rows except at the base of arms where they are set somewhat distantly in two alternating rows. They are markedly unequal, especially in the dorsal arms, where about two pairs near the umbrella margin are characteristically enlarged.

Right third arm hectocotylized, eight-ninths as long as the left third. Terminal organ conical, one-eleventh the entire length of the arm, provided with a well-defined copulatory groove which has distinct transverse striations. The suckers on the normal part 42 pairs.

Penis slender, 11 mm. long, bent crescentwise, connected with the duct of Needham's sac in advance of the middle. Needham's sac slender, bent into the shape of an L. Spermatophoric gland coils in company with its accessory gland. Spermatophores 52 mm. long.

Gill composed of 19 leaflets. Caecum of stomach reniform.

Color in alcohol uniformly reddish brown. Three obscure transverse stripes of a deeper shade are perceptible at the frontal region of head.

Total length 145 mm.; ventral length of mantle 25 mm.

Type.—Cat. No. 332972, U.S.N.M.

14. *POLYPUS PUSTULOSUS*, new species.

Plate 23, fig. 5.

Station 5092 (Sagami Sea). One female. Cat. No. 332976, U.S.N.M.

Superficial consistency soft, very loose, flabby. Dorsal surface uniformly and rather sparsely covered with minute warts. In addition to these there are found 20 or more, rather large, rounded regularly arranged tubercles. Above each eye are found two cirri, of which the posterior is the larger. Body as wide as long, with neither horizontal ridge around the periphery nor longitudinal groove on the belly. Mantle opening narrow.

Head broad, only a little narrower than the body. Umbrella of moderate breadth, generally extending a quarter up the arms. Funnel organ conspicuous, longer than half the distance between the anus and the end of the funnel, roughly W-shaped. The \wedge -shaped middle part of the W is composed of a broader ribbon than the outer limbs, while the anterior turned points are all rounded and the posteriorly turned points are both acuminate.

Arms unequal, the formula of length $1 > 2 > 3 > = 4$ the longest being about three times as long as the head and body taken together. All thick, provided with a broad thick contractile web on the ventral side. Suckers relatively large, distinctly biserial, excepting several at the base of the arms, which are distantly spaced in two alternating rows. None of the suckers specially enlarged on any arm.

Ink-bag large, pyriform. Proximal part of ink-duct sunk deep in the liver. Anal valves rather large. Caecum of the stomach large, hemispherical, slightly involute. Gill composed of 21 leaflets.

Vaginae slender, nearly straight, their distal ends separated from the anus by the length of the gill.

Color in formalin uniformly drab, but a little lighter beneath.

Total length 380 mm.; ventral length of mantle 63 mm.

Type.—Cat. No. 322976, U.S.N.M.

15. *POLYPUS CONISPADICEUS* Sasaki.

Polypus conispadiceus SASAKI, Annot. Zool. Japon, vol. 9, 1917, p. 367.

Station 4808 (Tsugaru Strait). Two males. Cat. No. 323986 U.S.N.M.

These two specimens are unhesitatingly referred to the present species but the suckers are, on the whole, larger, more expanded distally, and more closely set, than in the type specimen. Moreover, on each arm the suckers become rapidly larger to the eighth or ninth pair, succeeded by three or four pairs of still larger suckers, these are followed by about five pairs of suckers rapidly diminishing in size. Beyond these, the suckers become gradually smaller towards the

extremity of the arms. Of the two specimens the larger, which is 420 mm. in length, has in Needham's sac 22 spermatophores measuring 95 mm. in length, while the smaller, measuring 350 mm. in length, has no spermatophore anywhere.

16. *POLYPUS HONGKONGENSIS* Berry.

Octopus punctatus GABB, Proc. California Acad. Nat. Sci., vol. 2, 1862, p. 170 (not *O. punctatus* Blainville 1826).—DALL, Proc. California Acad. Nat. Sci., vol. 3, 1866, p. 243, fig. 27.

Polypus hongkongensis BERRY, Bull. Bureau Fish., vol. 30, 1912, p. 280, pl. 35, fig. 3; pl. 36, fig. 1; pl. 39, figs. 3, 4; pl. 40, fig. 1.

Polypus apollyon BERRY, Proc. Acad. Nat. Sci. Phila., 1913, p. 72, fig. 1.

Station Medni. One young. Cat. No. 332994, U.S.N.M.

Station 4777 (near Tanaga Island, Aleutian Islands). Two juv. Cat. No. 332997. U.S.N.M.

Station 4784 (near Near Island, Aleutian Islands). One female and one juv. Cat. No. 332994, U.S.N.M.

Station 4796 (near Shumagin Island). One juv. Cat. No. 332998, U.S.N.M.

Station 4803 (near Shimushir). Three juv. Cat. No. 332995, U.S.N.M.

Station 4868 (near Cape Clonard, Korea). One female. Cat. No. 332993, U.S.N.M.

Station 4957 (Hyuga-nada). Four specimens. Cat. No. 332992, U.S.N.M.

A male specimen from station 4957, which, though only 71 cm. long, is already mature enough to produce spermatophores, is referred with great hesitation to the present species. The warts on the surface are conical, roundish, and not continuous with one another at base as in other specimens. The suckers on each arm become rapidly larger to the eighth pair; then there come about four pairs of markedly enlarged suckers, which are in their turn succeeded by five or six pairs of rapidly diminishing suckers. The suckers on the hectocotylized arm number only 41 pairs, being several pairs fewer than in the ordinary form.

17. *POLYPUS SPINOSUS*, new species.

Plate 24, fig. 1.

Station 4807 (off Hakodate, Tsugaru Strait). One female. Cat. No. 332967, U.S.N.M.

Station 4809 (off Fukuyama, Tsugaru Strait). One female. Cat. No. 332968, U.S.N.M.

Surface somewhat thickly and evenly beset with comparatively large firm spinous warts with stellate bases. A single low warted cirrus is present above each eye. Body relatively large, without a keel

around the periphery. Mantle opening narrow, extending less than half around the body.

Head slightly narrower than body, weakly constricted behind. Umbrella well developed and continued along the ventral side of the arms to the extremity as a broad contractile web. Funnel rather short. Funnel organ, W-shaped, the middle \wedge -shaped part a little longer than the outer limbs.

Arms subequal; lateral pairs slightly longer than the others and about thrice as long as the body. Suckers small, relatively uniform, distinctly biserial but the first three are in a zigzag row.

Branchial leaflets 21 or 22 in each gill. Vaginae only slightly crooked; its freely projecting part only 1 mm. long, decidedly shorter than the renal papillae, and distant from the anus by the length of the gill.

Measurements of type: total length 85 mm.; ventral length of mantle 18 mm.; longest arm 55 mm.; longest radius of umbrella 18 mm.; diameter of largest sucker 1.8 mm.

Type-locality.—Off Fukuyama, Tsugaru Strait.

Type.—Cat. No. 332968, U.S.N.M.

18. POLYPUS LONGISPADICEUS Sasaki.

Polypus longispadiceus SASAKI, Annot. Zool. Japon., vol. 9, 1917, p. 366.

Station 4867 (near Cape Clonard, Korea). One mature male. Cat. No. 332984, U.S.N.M.

Station 4957 (Hyuga-nada). One mature male. Cat. No. 332985, U.S.N.M.

These specimens are referred with great doubt to the present species. In the specimen from the station 4867 the body has a distinct peripheral keel which is not found in the original specimens. The suckers are not relatively uniform but unequal, those near the umbrella margin being markedly enlarged on the first and second arms. In Needham's sac were found 48 spermatophores which are 89 mm. long and 1.2 mm. thick at the aboral end and 0.3 mm. thick at the oral, the sperm cord coiling about 150 turns. The principal measurements of the specimen are as follows: eye to posterior end of body 50 mm.; ventral length of mantle 42 mm.; breadth of either body or head 47 mm.; length of right first arm 185 mm.; of right second arm 181 mm.; of right third and fourth arm 178 mm.; length of hectocotylus 18 mm.; diameter of largest sucker on first arm 12 mm.; on second arm 11.5 mm.; on third arm 8 mm.; on fourth arm 6.5 mm.

In the specimen from the station 4957, the hectocotylized arm is a little shorter than the corresponding arm of the opposite side. The umbrella is broadest between the dorsal arms. The penis is 35 mm. long, but bent almost into the shape of a Z, and expanded near the middle. The spermatophoric gland coils and is folded in a manner different from that of the original specimens. Principal measure-

ments: eye to posterior end of body 65 mm.; ventral length of mantle 55 mm.; breadth of body 53 mm.; breadth of head 48 mm.; length of first arms about 280 mm.; of second arms 270 mm.; of left third arm 248 mm.; of right third arm 240 mm.; of right fourth arm 240 mm.; diameter of largest sucker on first and second arm 15 mm.; on third arm 13 mm.; on fourth arm 11 mm.

19. *POLYPUS YENDOII*, new species.

Plate 24, fig. 2.

Station 4844 (near Oki Island, Krusenstern Strait). One male and female. Cat. No. 332990, U.S.N.M.

Station 4855 (near Cape Clonard, Korea). Six males and five females. Cat. No. 332987, U.S.N.M.

Station 4858 (near Cape Clonard, Korea). One female. Cat. No. 332988, U.S.N.M.

Station 4868 (off Yon-hai, Korea). One female. Cat. No. 332989, U.S.N.M.

Station 5804 (off Kinka-san). One male and female. Cat. No. 332991, U.S.N.M.

Consistency soft, somewhat flabby. Skin loose. Dorsal surface sparsely beset with well-marked roundish warts of various sizes, their thickest distribution being above and behind eyes. No cirri above the eyes. Body about as broad as long, widest about the middle or a little posterior to it; belly nearly flat, sometimes forming a faint longitudinal groove in the middle; periphery bordered with a distinct horizontal ridge all around. Mantle opening narrow, extending a little less than half around the body.

Head large, only a little narrower than the body, more distinctly marked off anteriorly than posteriorly, with somewhat prominent eyes. Umbrella well developed, broadest between ventral arms. Funnel extensively incorporated with head, the freely projecting part being very short. Funnel organ W-shaped, the median \wedge -shaped part far longer than the outer limbs.

Arms subequal, the formula of length being $1 > 2 > 3 = 4$; the longest about four times the body-length. Suckers rather small, sparsely biserial throughout. The largest suckers on each arm are the ninth to eleventh pair which are opposite the umbrella edge, and frequently show a special enlargement on the first and second arms. Right third arm hectocotylized, decidedly shorter than the left third. Full-formed terminal organ about one-thirteenth the entire length of the arm; its copulatory groove well-defined and marked by numerous transverse streaks. The suckers on this arm number 49–52 pairs.

Gill composed of 21 or 22 leaflets. Full-formed ovary very large; its eggs also conspicuous, measuring 17 by 7 mm. Vaginae thick, short, terminating far behind the anus. Full-formed penis about

25 mm. long, elongated, nearly straight, devoid of diverticle. Spermatophores about 90 mm. long, their opaque part 25–28 mm. long, consisting of 110 by 120 coils of sperm cord.

Total length up to 262 mm. in male, and 290 mm. in female.

Type locality.—Near Cape Clonard, Korea.

Type.—Cat. No. 332987a, U.S.N.M.

20. POLYPUS ALATUS, new species.

Plate 24, fig. 4.

Station 4957 (Bungo-suido). One mature male. Cat. No. 332978, U.S.N.M.

Station, unknown. One immature male. Cat. No. 332979, U.S.N.M.

Surface quite smooth, somewhat firm to the touch. Body compact, broadest posteriorly, bordered with a horizontal ridge along periphery. Mantle-opening narrow, extending less than half around the body. Umbrella well developed, on an average extending for about one-fourth the length of arms, and then continuing along the ventral side almost to the extremity as a broad fleshy contractile web. Funnel slender, well defined. Funnel organ small, W-shaped.

Arms very unequal, the formula of length being $1 > 2 > 3 > 4$; the longest about five times the length of head and body taken together. Suckers small, low, closely arranged in two well separated rows excepting several proximal ones which are in a single straight or zigzag row.

Right third arm hectocotylized, three-fourths as long as the left third, bearing 40–45 pairs of suckers on the normal part. Terminal organ roughly conical, comparatively thick and short, comprising a little less than $\frac{1}{2}$ the entire length of the arm.

Penis elongated, fusiform, broadest in advance of the middle where it is connected with the duct of the L-shaped Needham's sac. Spermatophores 48 mm. long, very thin excepting the aboral end which is markedly swollen.

Gill composed of 22 leaflets. Caecum of the stomach elliptical in outline, a little involute.

Measurements of type; total length 440 mm.; ventral length of mantle 55 mm.; longest arm 340 mm.; hectocotylized arm 190 mm.; longest radius of umbrella 80 mm.; diameter of largest sucker 5 mm.

Type-locality.—Bungo-suido.

Type.—Cat. No. 332978, U.S.N.M.

21. POLYPUS MACROPUS Risso.

Octopus macropus HOYLE, *Challenger* Cephalopoda, 1886, pp. 11, 95.—ORTMANN, *Japanische Cephalopoden*, 1888, p. 643, pl. 21, fig. 3. — JOUBIN, *Bull. Soc. Zool. France*, vol. 22, 1897, p. 99.

Octopus curvieri APPELLÖF, *Japanska Cephalopoder*, 1886, p. 6, pl. 1, fig. 6.

Polypus macropus WÜLKER, *Doflein Beitr. Naturgesch. Ostasiens*, 1910, p. 8.—BERRY, *Japanische Cephalopoda*, 1912, p. 389.

Station 4872 (east of Tsushima). One juv. specimen. Cat. No. 332960, U.S.N.M.

Station 5005 (Sakhalin). One immature male. Cat. No. 332962, U.S.N.M.

Nagasaki. One immature male. Cat. No. 332958, U.S.N.M.

Shimonoseki. One immature female. Cat. No. 332957, U.S.N.M.

Station 4942 (off Osumi). One immature female. Cat. No. 332961, U.S.N.M.

Shimizu, Suruga. One male. Cat. No. 332959, U.S.N.M.

These specimens are referred with a great deal of hesitation to *Polypus macropus*, although they agree in most particulars with the descriptions of the authors consulted. On the whole I have much doubt whether the species extends as far as the Japanese waters from its home; that is, the Mediterranean Sea. As far as I have examined, indeed, there exist many specific discrepancies between that species and the Japanese form which have been considered identical by authors. The principal differences consist in the structure of the funnel organ, hectocotylus, and spermatophores. Of these points I shall have to speak more in detail in another publication.

22. POLYPUS MACROPUS, var. MINOR, new variety.

Station 5074 (Suruga Bay). Two mature males. Cat. No. 332963, U.S.N.M.

Surface faintly warty, rather soft to the touch. Body elongated, nearly fusiform, somewhat pointed behind; no horizontal ridge present on sides nor longitudinal groove on belly. Mantle opening broad, extending more than half around the body.

Head about as broad as body, concave above, marked off by a strong constriction both in front and behind. Funnel small, its freely projecting part slender. Funnel organ small, consisting of two far separated V-shaped pads, of which the inner limb is $\frac{1}{2}$ – $\frac{3}{5}$ as long as the outer.

Arms greatly unequal, the formula of length being $1 > 2 > 3 > 4$; longest pair about seven times as long as body. All quadrangular in section in the proximal parts and roundish in the distal, lacking contractile web on either side. Umbrella ill developed, its radius varying with the length of the arm along which it extends. Suckers prominent, rather sparsely set in two alternating rows.

Right third arm markedly affected by hectocotylization, being much shorter than the left third; on the normal part there are found only 21 or 24 pairs of suckers. Terminal organ conspicuous, about one-seventh the entire length of the arm, nicely spoon-shaped, with ample copulatory groove.

Gill composed of only 15–17 leaflets.

Penis comparatively large, a little coiled, the entire contour being triangular, the center of which is connected with the duct of Needham's sac. Spermatophores 23 mm. long, 1 mm. thick; discharging tube 15 mm. long, smooth, neither coiling nor striated. Coils of sperm cord 19.

Principal measurements of type: Total length 182 mm.; ventral length of mantle 20 mm.; longest arm 145 mm.; left third arm 76 mm.; right third arm 3 mm.; diameter of largest sucker 2.4 mm.; longest radius of umbrella 14 mm.

Type.—Cat. No. 332963a, U.S.N.M.

23. *POLYPUS TENUIPULVINUS*, new species.

Plate 24, fig. 5.

Station 5092 (Sagami Sea). One female. Cat. No. 332977, U.S.N.M.

Consistency firm, fleshy. Skin wrinkled in all parts, dorsal surface finely tessellated with innumerable grooves, and beset with some numbers of tubercles regularly distributed almost as in *P. vulgaris*. Body compact, as long as broad, devoid of a horizontal ridge around the periphery. Head a little narrower than the body, marked off by constrictions both in front and behind. Umbrella poorly and equally developed all round.

Funnel organ peculiarly characterized, consisting of two slender hooked-shaped pads, which begin at the funnel extremity and extend two-thirds down the distance to the anus.

Arms unequal, the formula of length $1 > 2 > 3 > 4$ in the right side and $2 > 3 = 1 > 4$ in the left; the longest about twice the shortest and about one-seventh the body length; all roundish, devoid of even a trace of contractile web on either side. Suckers small, rather sparsely set in two rows but at the base of the arms they are in a zigzag line. None of the suckers specially enlarged.

Caecum of stomach elongated bent into an L-shape. Gill composed of 16 leaflets only. Vaginae thick, straight, terminating far behind the anus.

Total length 155 mm.; ventral length of mantle 19 mm.

Type.—Cat. No. 332977, U.S.N.M.

24. *POLYPUS SALEBROSUS*, new species.

Station 5050 (off Kinka-san). One female. Cat. No. 332969, U.S.N.M.

Station 5029 (Okhotsk Sea). One juv. female. Cat. No. 332970, U.S.N.M.

Skin rather loose, soft. Surface quite rough in all parts, thickly beset with peculiar, coarse well-defined warts, which on the lateral and ventral surface of body run together into longitudinal lines.

Body subglobose, bearing no horizontal keel around the periphery. Mantle opening of moderate breadth. Head broad, but narrower than the body. Neck constriction weak. Umbrella thick, fleshy, extending about one-third the length of the arms, but between the ventral arms its extent is only $\frac{1}{4}$ – $\frac{1}{5}$. Funnel organ W-shaped, about half as long as the distance from anus to funnel extremity, situated slightly nearer to the former than to the latter.

Arms subequal, the formula of length being $4 > 3 > 2 > 1$; very short, even the longest only about two times or two and a half times the body-length. All conical, rather rapidly tapering toward the extremities, without contractile webs. Suckers rather sparsely set in two alternating rows; none specially enlarged.

Ovary much more expanded sideways than lengthwise. Vaginae thick, slightly curved, terminating far behind the anus. Gill composed of 19 leaflets.

Color in alcohol uniformly light cardinal to claret red throughout. Total length of type 153 mm.; ventral length of mantle 40 mm.

Type locality.—Off Kinka-san, Rikuzen Prov.

Type.—Cat. No. 332969, U.S.N.M.

25. POLYPUS VALIDUS, new species.

Plate 24, fig. 3.

Station 4915 (near Koshiki Island, Satsuma Province). One fully mature male. Cat. No. 332971, U.S.N.M.

Consistency rather firm, fleshy. Skin thickly warty except at the ventral surface of the head, mid-ventral region of body, the margin of the umbrella, the distal parts of the three dorsal pairs of arms and the whole surface of ventral arms; all of which are quite smooth. Warts conspicuous, nearly stelliform or rosette shaped, well defined so that the skin between them is quite smooth and even. They are largest above the head and body, becoming smaller peripherally and ventrad, thus attaining a minimum size along the boundary region of the warted area; the transition from the warty to the smooth condition taking place somewhat suddenly.

Body slightly broader than long, without keel along periphery but with a deep median longitudinal sulcus on the belly. Mantle opening of moderate breadth.

Head a little narrower than the body. Neck constriction very weak. Umbrella of moderate and uniform breadth all around, extending about a quarter up the arms, continuing along either side to the extremity as a ridge.

Arms subequal, the formula of length being: $1 > 2 > 3 > 4$; the longest a little longer than twice the body-length. Suckers biserial excepting the first four or five, which are in a zigzag line. They become somewhat rapidly larger to the tenth pair on each arm; from

this to the fourteenth pair are the largest, which are situated near the umbrella edge; then they diminish gradually toward the extremity.

Right third arm prominently hectocotylized, robust, much shorter and thicker than the left third, terminating quite abruptly. Terminal organ short, thick, a little flattened dorso-ventrally, narrowing somewhat distad to a quite blunt extremity. Copulatory groove smooth, widely excavated. Suckers on the normal part 22 pairs.

Branchial leaflets only 15 in each gill. Penis cylindrical, 20 mm. by 4 mm. Spermatophores 48 mm. long, 1.4 mm. thick at aboral part.

Total length 184 mm.; ventral length of mantle 39 mm.

Type.—Cat. No. 332971, U.S.N.M.

Genus SCAEURGUS Troschel.

25. SCAEURGUS PATAGIATUS Berry.

Scaeurgus patagiatus BERRY, Proc. Acad. Nat. Sci. Philadelphia, 1913, p. 564.—BERRY, Hawaiian Cephalopoda, 1914, p. 305, pl. 47, figs. 2, 3; pl. 48, fig. 1; text fig. 19.

Station 4924 (south of Kyushu). One male. Cat. No. 332954, U.S.N.M.

The specimen differs from Berry's description in having neither the ridge-like fold above the body nor the vertical papilla behind it. Furthermore there is only one cirrus above each eye instead of two as described by Berry; the umbrella is broadest at the lateral parts not at the dorsal.

Suborder DECAPODA Leach

Division MYOPSIDA d'Orbigny.

Family LOLIGINIDAE d'Orbigny.

Genus LOLIGO Schneider.

27. LOLIGO EDULIS Hoyle.

Loligo edulis HOYLE, *Challenger* Cephalopoda, 1886, p. 152, pl. 23.

Station 4963 (Kii-suido). Two young. Cat. No. 332902, U.S.N.M.

28. LOLIGO JAPONICA Steenstrup.

Loligo japonica HOYLE, *Challenger* Cephalopoda, 1886, p. 157, pl. 24, figs. 7-15.

Station Hakodate. Two females. Cat. No. 332904, U.S.N.M.

Hakodate market. One female and seven males. Cat. No. 332903, U.S.N.M.

29. LOLIGO BLEEKERI Keferstein.

Loligo bleekeri KEFERSTEIN, Bronn's Klass. und Ordn. d. Thierreiches, 1866, p. 1402, pl. 122, figs. 9, 10; pl. 127, fig. 14.—APPELLÖF, *Japanska Cephalopoder*, 1886, p. 31, pl. 1, figs. 7-10.

Station 4872 (east of Tsushima). Thirty-one young. Cat. No. 332905, U.S.N.M.

Station 4873 (east of Tsushima). Three young. Cat. No. 332906, U.S.N.M.

Genus SEPIOTEUTHIS de Blainville.

30. SEPIOTEUTHIS LESSONIANA Férussac.

Sepioteuthis lessoniana FÉRUSSAC and D'ORBIGNY, Céphalopodes acétabulifères—1839, p. 302, Sepioteuthis, pl. 1; pl. 6, figs. 9–14.—APPELLÖF, Japanska Cephalopoder, 1886, p. 32, pl. 1, fig. 11; pl. 3, figs. 11–15.

Kagoshima market. One specimen. Cat. No. 332944, U.S.N.M.

Family SEPIOLIDAE Keferstein.

Subfamily SEPIOLINAE Hoyle.

Genus SEPIOLA Leach, emendation.

31. SEPIOLA BIROSTRATA Sasaki.

Sepiola iniotheuthis SASAKI, Zool. Mag. Tokyo, vol. 25, 1913, p. 251, 1 fig. (part.)

Iniotheuthis iniotheuthis SASAKI, Ann. Zool. Japon., vol. 8, 1914, p. 594 (part.)

Sepiola birostrata SASAKI Zool. Mag. Tokyo, vol. 30, 1918, p. 235.

Station 4807 (Tsugaru Strait). One female. Cat. No. 332878, U.S.N.M.

Station 4835 (Wakasa Bay). Two males and females. Cat. No. 332879, U.S.N.M.

Station 4835 (Wakasa Bay). One female and two males. Cat. No. 332880, U.S.N.M.

Station 4838 (Wakasa Bay). One female and five males. Cat. No. 331881, U.S.N.M.

Station 4839 (Wakasa Bay). One male and female. Cat. No. 332882, U.S.N.M.

Station 4843 (near Oki Island). One female, two males and one juv. Cat. No. 332883, U.S.N.M.

Station 4844 (Wakasa Bay). Six males. Cat. No. 332884, U.S.N.M.

Station 4868 (east coast of Korea). One male. Cat. No. 332885, U.S.N.M.

Station 5031 (Nemuro Strait). One male. Cat. No. 332886, U.S.N.M.

Station 5032 (Nemuro Strait). One female. Cat. No. 332887, U.S.N.M.

Station 5046 (off Kinka-san). One male. Cat. No. 332888, U.S.N.M.

Station 5047 (off Kinka-san). One female and two males. Cat. No. 332989, U.S.N.M.

Station—5048 (off Kinka-san) One male and one female. Cat. No. 332890, U.S.N.M.

Station 5050 (off Kinka-san). One female. Cat. No. 332891, U.S.N.M.

Station Sado Island. One female. Cat. No. 332877, U.S.N.M.

This species has not been fully described in English so that a description of it here seems to be advisable.

Mantle purse-shaped, a little longer than broad; anterior margin connected with the head at the nape by a commissural integument narrower than one-third the body-breadth; ventral edge emarginated crescentwise, the excavation marked off by projections. Fins semi-lunar or subovate, about five-sevenths as broad as long, and $\frac{1}{2}$ – $\frac{3}{4}$ as long as the body; auriculated anteriorly, attached to the dorso-lateral surfaces of the body at the middle of its length.

Head as wide as, or even broader than body; with large full eyes which form an incompletely circular lid-fold ventrally. Umbrella ill developed except between third and fourth arms, where it extends about a quarter up the arms. Funnel slender, extending less than to interbrachial space, clearly marked off throughout, widely conical at base and tubular distally. Funnel organ composed of a triangular dorsal pad and two elliptical ventral pads. Funnel cartilage oblong, a little longer than three times its own breadth.

Arms subequal, the formula of length being $2=3>4=1$, the longest about as long as the body. Third pair in mature males peculiarly thickened in the proximal parts, attenuated in the distal, and strongly curved into the shape of an S. Suckers biserial, numbering about 25 pairs on each arm; in the female, small and comparatively uniform; in male, unequal, largest at the middle of arms but uniform in first arms and rudimentary in the third.

Left dorsal arm prominently hectocotylized, $\frac{1}{2}$ – $\frac{4}{5}$ as long as the right dorsal; thickened, terminating abruptly. On the base of the arm, there are found four or five minute suckers, followed by a large rounded swelling on the ventral side; the swelling produces two conical sharply pointed recurved rostra, of which the anterior one is usually much larger than the posterior. The remaining part of the arm has about 40 papillae tightly palisaded in two rows and bearing minute suckers on their tips.

Tentacles slender, decidedly thinner than any of the arms, and twice as long as the ventral arms. Club about one-fourth the entire length of tentacles, slightly expanded, flattened, with very narrow dorsal web. A broad semilunar membrane is present on the dorsal side of the carpus. Suckers equally minute, shallow, numbering only four in a row at the base of the club but about sixteen in a row at its subterminal part; horny ring with about twenty blunt separate teeth.

Saddle-shaped luminous organ well developed. Spermatophores about 13 mm. long.

Mantle length 8–15 mm. in males, 8–14 mm. in females.

Genus EUPRYMNA Steenstrup.

32. EUPRYMNA MORSEI (Verrill).

Inioteuthis morsei VERRILL, Trans. Conn. Acad. Sci., vol. 5, 1881, p. 417, footnote.—APPELLÖF, Japanska Cephalopoder, 1888, p. 15, pl. 2, fig. 15; figs. 16, pl. 3, figs. 16, 19, 20, 23.—HOYLE, Challenger Cephalopoda, 1886, p. 112, pl. 14, figs. 1-9.

Euprymna morsei STEENSTRUP, Notae Teuthologicae, vol. 7, 1887, pp. 66, 89.—WÜLKER, Dofein Beitr. Naturgesch. Ostasiens, 1910, p. 9, pl. F, fig. 9; pl. 3, figs. 23, 24; pl. 4, fig. 40.—BERRY, Japanese Cephalopoda, 1912, p. 408, pl. 6, figs. 1, 2.

Station Shimizu, Suruga. One male. Cat. No. 332876, U.S.N.M.

33. EUPRYMNA SIMILIS Sasaki.

Euprymna similis SASAKI, Ann. Zool. Japon, vol. 8, 1914, p. 591, pl. 11, figs. 5-8.

Station Hakodate market. Two males and three females. Cat. No. 332872, U.S.N.M.

Station Hakodate Bay. Five females and ten males. Cat. No. 332873, U.S.N.M., Cat. No. 332874, U.S.N.M. and Cat. No. 332875, U.S.N.M.

These specimens agree in some points with Berry's description of *E. scolopes*, but the proximal suckers of the hectocotylized arm are much fewer than given by him, numbering only 23-27, and the nipple-like protuberances (Berry's modified papillae) of the arm are less modified, often revealing the appearance of ordinary suckers. In the males from Hakodate Bay, the three ventral arms resemble those of the male described by Berry in having about ten conspicuous suckers in the ventral marginal row; this seems, however, to be a case of abnormality.

Genus SEPIOLINA Naef.

34. SEPIOLINA NIPPONENSIS (Berry).

Stoloteuthis nipponensis BERRY, Zool. Anz., vol. 37, 1911, p. 39, 1 fig., Japanese Cephalopoda, 1912, p. 414, pl. 5, figs. 1-4.

Sepiolina nipponensis NAEF, Teutholog. Notizen, vol. 1, 1912, p. 248.—SASAKI, Ann. Zool. Japon, vol. 8, 1914, p. 597.

Station 4903 (near Goto Islands). One male. Cat. No. 332865, U.S.N.M.

Station 4940 (Van Diemen Strait). One male. Cat. No. 332866, U.S.N.M.

Station 4941 (Van Diemen Strait). Two females and four males. Cat. No. 332867, U.S.N.M.

Station 4942 (Van Diemen Strait). One male. Cat. No. 332868, U.S.N.M.

Station 4943 (Van Diemen Strait). Two females and three males. Cat. No. 332869, U.S.N.M.

Station 5055 (Suruga Bay). One male. Cat. No. 332870, U.S.N.M.

Station 5069 (Suruga Bay). One female. Cat. No. 332871, U.S.N.M.

These specimens differ from Berry's description at least in having broader umbrella and smaller fins. The latter do not extend to the anterior margin of the mantle, the forward lobe being somewhat shorter than illustrated by him. In good specimens the periphery of the belly is embellished by a broad distinct U-shaped zone of pearly luster.

Genus **ROSSIA** Owen.

35. ROSSIA PACIFICA Berry

Rossia pacifica BERRY, Bull. Bureau Fish., vol. 30, 1912, p. 290. pls. 41-42; pl. 43, figs. 1-4; pl. 44, figs. 1, 5.—SASAKI, Ann. Zool. Japon, vol. 8, 1914, p. 598.

Station 4779 (near Semipochnoi Island, Aleutians). Two females. Cat. No. 332825, U.S.N.M.

Station 4784 (near Attu Island, Aleutians). Two males. Cat. No. 332817, U.S.N.M.

Station 4810 (Tsugaru Strait). One female. Cat. No. 332819, U.S.N.M.

Station 4812 (north of Sado Island). Two males and three females. Cat. No. 332809, U.S.N.M.

Station 4813 (north of Sado Island). One male and seven females. Cat. No. 332803, U.S.N.M.

Station 4822 (Noto Peninsula). Three females and five males. Cat. No. 332807, U.S.N.M.

Station 4826 (Noto Peninsula). One female. Cat. No. 332822, U.S.N.M.

Station 4828 (Noto Peninsula). One male. Cat. No. 332815, U.S.N.M.

Station 4834 (off Echizen Province). One male and female. Cat. No. 332821, U.S.N.M.

Station 4835 (off Echizen Province). One female. Cat. No. 332829, U.S.N.M.

Station 4838 (Wakasa Bay). One female. Cat. No. 332826, U.S.N.M.

Station 4843 (near Oki Island, Krusenstern Strait). One male and female. Cat. No. 332827, U.S.N.M.

Station 4844 (near Oki Island, Krusenstern Strait). One male and female. Cat. No. 332810, U.S.N.M.

Station 4844 (near Cape Clonard, Korea). One male. Cat. No. 332816, U.S.N.M.

Station 4858 (near Cape Clonard, Korea). Three females and four males. Cat. No. 332828, U.S.N.M.

Station 4859 (near Cape Clonard, Korea). Two females. Cat. No. 332811, U.S.N.M.

Station 4860 (near Cape Clonard, Korea). Two males. Cat. No. 332808, U.S.N.M.

Station 4868 (near Cape Clonard, Korea). Two females and four males. Cat. No. 332812, U.S.N.M.

Station 4869 (near Cape Clonard, Korea). One female and two males. Cat. No. 332820, U.S.N.M.

Station 4870 (near Cape Clonard, Korea). One male and female. Cat. No. 332812, U.S.N.M.

Station 4871 (near Cape Clonard, Korea). One female. Cat. No. 332802, U.S.N.M.

Station 4989 (near Kamoi-saki, Hokkaido). Two males and three females. Cat. No. 332801, U.S.N.M.

Station 4993 (near Rebun Island, Hokkaido). Five males. Cat. No. 332813, U.S.N.M.

Station 4994 (near Rebun Island, Hokkaido). Two males. Cat. No. 332818, U.S.N.M.

Station 5010 (near Korsakova, Sakhalin). One female and two males. Cat. No. 332814, U.S.N.M.

Station 5031 (Nemuro Strait). One male and two females. Cat. No. 332823, U.S.N.M.

Station 5042 (off Hidaka Province, Hokkaido). Four females and six males. Cat. No. 332805, U.S.N.M.

Station 5047 (off Kinka-san). Two females and three males. Cat. No. 332824, U.S.N.M.

Station 5048 (off Kinka-san). Four males and females. Cat. No. 332804, U.S.N.M.

These specimens measure from 12 mm. to 79 mm. in length, and are all properly referred to the present species. A female from station 5031 differs from the others in having a very slender body, though revealing no differences in other respects. The measurements of this specimen are as follows: Dorsal length of mantle 65 mm.; breadth of mantle 34 mm.; length of fins 34 mm.; breadths of fins 20 mm. and 18 mm.

36. *ROSSIA MOLLICELLA*, new species.

Plate 25, fig. 1.

Station 4967 (off Kii Province). Two females. Cat. No. 332831, U.S.N.M.

Station 4972 (off Kii Province). One male. Cat. No. 332833, U.S.N.M.

Station 5051 (off Kinka-san). One female. Cat. No. 332832, U.S.N.M.

Surface smooth, very soft to the touch, the integument being rather flabby.

Mantle expanded anteriorly, rounded posteriorly, as long as wide or a little longer. Anterior margin free all round, its ventral part projecting forward more than the dorsal margin but with a faint

emargination in the middle. Fins very large, nearly semilunar, about four-fifths as broad as long, and about two-thirds as long as the mantle-length, feebly indented at the anterior origin.

Head very large, decidedly broader than mantle, with big eyeballs. Nuchal cartilage oblong, a little shorter than twice its breadth, nearly parallel-sided and similarly rounded on both ends. Funnel broad. Funnel organ as in *R. pacifica*. Funnel cartilage oblong, a little longer than twice its own breadth.

Arms unequal, the formula of length being $3 = 2 > 1 > 4$; the longest a little longer than the mantle-length. Suckers biserial, on the whole, a little larger in the male than in the female, specially so on the lateral arms. Horny ring smooth; external aperture narrow and slit-like; papillate area narrow, composed of about seven rows of facets, the papillae of which are all faint. Umbrella similarly narrow all around.

Both dorsal arms hectocotylized, being quite similarly constructed in every respect. On the lateral aspect of the outer side there is found a deep groove, marked off by a wide fold running through the entire length. The suckers of these arms are affected but little by hectocotylization, and number 42 and are only a little smaller than those of the lateral arms.

Tentacles when bent back, reaching the posterior end of the mantle. Stem about as thick as, or a little thinner than, the arms. Club occupying a quarter of the tentacle, not expanded, bent round, with a narrow semilunar membrane on the dorsal side of the carpus. Suckers numerous, minute, nearly uniform, arranged in about eight rows; horny ring smooth.

Measurements of type: Dorsal length of mantle 36 mm.; ventral length of mantle 39 mm.; breadth of mantle 33 mm.; length of longest arm 42 mm.; diameter of largest arm-sucker 19 mm.

This species stands near *R. megaptera* but differs from it in the ventral margin of the mantle, in the tentacular length, in the arm-formula, and in the horny ring of arm-suckers.

Type-locality.—Off Kii Province.

Type.—Cat. No. 332833, U.S.N.M.

37. ROSSIA BIPAPILLATA, new species.

Plate 25, fig. 3.

Station 5069 (Suruga Bay). One female. Cat. No. 332830, U.S.N.M.

Surface smooth, soft to the touch. Mantle a little longer than broad, of nearly equal breadth in the anterior half, rounded posteriorly. Mantle margin free all around; its ventral part projecting as much as the mid-dorsal part, and forming a shallow crescentic emargination in the middle. Fins large, being only a little shorter than the body; semicircular, about half as long again as broad, their anterior origin somewhat indented, and the most anterior edge extending a little beyond the mantle margin.

Head wider than the mantle, with full, large eyeballs. Umbrella very narrow, funnel organ composed of a conspicuous horseshoe-shaped dorsal pad and two ovate ventral pads. Funnel cartilage oblong, slightly longer than twice its own breadth.

Arms long, subequal, the formula being $3 > 2 > 1 = 4$; the longest as long as the mantle. Suckers biserial, nearly uniform; aperture circular. Horny ring smooth; papillate area composed of an irregularly radiated narrow margin and about four irregular rows of plates; these have a minute indistinct papilla in the middle.

Tentacles about three times as long as the mantle-length; their stems a little thinner than the arms. Club cylindrical, slightly expanded; carpus with a narrow web on the dorsal side. Suckers exceedingly numerous, very minute, forming oblique rows of 24 each.

A peculiar papilliform organ of unknown function developed on either side of the rectum.

Length of mantle 19 mm.; maximum breadth of mantle 16 mm.; length of longest arm 20 mm.; diameter of largest sucker 0.8 mm.

Type.—Cat. No. 332830 U.S.N.M.

Family IDIOSEPIIDAE Appellöf.

Genus IDIOSEPIUS Steenstrup.

38. IDIOSEPIUS PYGMAEUS Steenstrup.

Idiosepius pygmaeus, STEENSTRUP, Danske Vid. Selsk. Skrift., ser. 6, vol. 1, 1881, p. 219, pl. 1, figs. 11–22.—APPELLÖF, Cephalopoden von Ternate, 1898, pp. 562, 572, pl. 32, figs. 1–5, 7; pl. 33, figs. 11–13, 20, 22; pl. 34, figs. 24, 26, 29, 30.—SASAKI, Ann. Zool. Japon., vol. 8, 1914, p. 599.

Station Hakodate Bay. One male and female specimen. Cat. No. 332893, U.S.N.M., and Cat. No. 332894, U.S.N.M.

These specimens agree with Appellöf's description more than with Steenstrup's. The hectocotylyzed arms have each seven suckers, and the tentacles are as thick as the arms, their distal two-thirds beset with about 42–50 suckers of bi-quadriseserial arrangement. Mantle-length 12 mm. in male and 15 mm. in female.

Family SEPIIDAE.

Genus SEPIA Linnaeus.

39. SEPIA ESCULENTA Hoyle.

Sepia esculenta HOYLE, Challenger Cephalopoda, 1886, p. 129, pl. 18, figs. 1–6.—APPELLÖF, Japanska Cephalopoder, 1886, p. 28, pl. 3, figs. 1–6.—SASAKI, Annot. Zool. Japon. vol. 8, 1914, p. 611.

Station: Tsuruga, Tango Prov. One male. Cat. No. 332834, U.S.N.M.

This specimen is a fully mature male, measuring 153 mm. in mantle length. It agrees well with Hoyle's description and the mid-ventral

groove of the gladius is shallower than was illustrated by Appellöf. The modified suckers in the hectocotylized arm number about 20.

40. *SEPIA ELLIPTICA* Hoyle.

Sepia elliptica HOYLE, *Challenger Cephalopoda*, 1886, p. 131, pl. 19, figs. 14-24.—WÜLKER, *Doflein Beitr. Naturgesch. Ostasiens*, 1910, p. 11.—BERRY, *Japanese Cephalopoda*, 1912, p. 419.—SASAKI, *Ann. Zool. Japon.*, vol. 8, 1914, p. 612, pl. 11, figs. 11, 12.

Station 4938 (near Sata-misaki, Kiushiu.) One female. Cat. No. 332844, U.S.N.M.

Station 4876 (Krusenstern Str.). Two specimens. Cat. No. 332847, U.S.N.M.

The mantle of these specimens measures 26-31 mm. in length. They agree well with Hoyle's description except that the rim of the inner cone runs straight posteriad, bordering the striated area throughout and does not curve nor rise into any special wall-like ridge.

41. *SEPIA CARINATA*, new species.

Plate 25, fig. 2; plate 26, fig. 1.

Station 5092 (Sagami Sea). One specimen. Cat. No. 332849, U.S.N.M.

Station 5094 (Sagami Sea). One specimen. Cat. No. 332848, U.S.N.M.

Mantle roughly ovate in contour, a little narrower than half its own dorsal length, pointed behind; dorsal margin protruding far over the head in a triangular lobe about one-fifth the entire length. Fins rather wide, about one-fifth as wide as the mantle, beginning at some distance from the mantle margin and extending so far backward that their bases come almost into contact with each other above the rostum. Head a little wider than the mantle and one-third as long.

Arms subequal, the lateral pairs shorter than the others, which are about one-third as long as the mantle. Suckers thickly set in four series, except at the extreme base and tip of arms where they are biserial. Horny ring smooth, but sometimes armed with very short, broad, unequal teeth on the margin.

Tentacles about as long as the mantle. Ciub somewhat flattened, expanded, curved into a crescent-shape, occupying the distal sixth of the tentacle. Suckers seemingly in five series, but numbering eight in an oblique-transverse row; unequal, about three in a submedian series being by far the largest, and larger than the arm-suckers. Horny ring of these largest suckers armed with about 20 blunt or square-cut, far separated teeth.

Gladius very broad, thin, two and a half times as long as its own maximum breadth, which is, in turn, three or four times as broad as the thickness. Dorsal surface evenly convex, but its antero-mesial

part flattened except for a faint broad longitudinal ridge marked off by two shallow grooves on the sides; the post-mesial part characteristically elevated into a short but broad ridge. Calcareous deposition very thin but considerably extensive so that the naked area is almost obliterated. Ventral surface shallowly concave in the posterior parts but convex in the anterior, the convexity equaling that of the dorsal surface in depth; median groove very narrow and shallow especially in the last loculus. The outer cone starts in the vicinity of the anterior end of striated area, forming a part of the margin on both sides of the same area, and abruptly expanded in the posterior parts into a broad cup-shaped cone. Inner cone poorly developed, its rim very thin throughout, without forming any actual cone but a thickened arch overhanging the shallow posterior hollow of the shell. Locular index 42-44.

Measurements of type: dorsal length of mantle 26 mm.; breadth of same 14 mm; mantle extent before fins 3 mm.; longest arm 9 mm.

Type.—Cat. No. 332849, U.S.N.M.

42. SEPIA APPELLÖFI Wülker.

Sepia appellöfi WÜLKER, Doflein Beitr. Naturgesch. Ostasiens, 1910, p. 14, figs. 8, 15-18.

Sepia (Doratosepion) appellöfi BERRY, Japanese Cephalopoda, 1912, p. 424.—SASAKI, Annot. Zool. Japon., vol. 8, 1914, p. 618.

Station 4875 (Krusenstern Strait). One male and female.

Station 4884 (west of Amakusa, Kiushiu). One female.

Station 4885 (west of Amakusa, Kiushiu). Two specimens. Cat. No. 332839, U.S.N.M.

Station 4933 (off Satamisaki, Kiushiu). One juv. Cat. No. 332843, U.S.N.M.

Station 5095 (Sagami Sea). One female. Cat. No. 332842, U.S.N.M.

These specimens agree well with Wülker's description, but the specimen from the station 4933, which is a young individual of 32 mm. mantle length, has a much wider gladius than the original specimen. This seems, however, due to age and not to difference in species.

43. SEPIA ANDREANA Steenstrup.

Sepia andreana STEENSTRUP, Danske Vid. Selsk. Skrift, ser. 5, vol. 10, 1875, p. 474, pl. 1, figs. 11-19.—WÜLKER, Doflein Beitr. Naturgesch. Ostasiens, 1910, pp. 19, 22, 24.

Sepia (Doratosepion) andreana BERRY, Japanese Cephalopoda, 1912, p. 422.—SASAKI, Annot. Zool. Japon., vol. 8, 1914, p. 613.

Hakodate market. One male and four females. Cat. No. 332835, U.S.N.M., and Cat. No. 332836, U.S.N.M.

Hakodate. Six specimens. Cat. No. 332837, U.S.N.M.

In the female of the above list, the arm-formula is not constant, being $2 > 3 = 1 = 4$, or $2 > 1 = 3 > 4$, or $2 > 3 > 1 > 4$. The second arms are only slightly longer than the others and not so peculiarly elongated nor otherwise characterized as in the males; this causes the specimen to closely resemble *Sepia kobeensis* in appearance.

44. *SEPIA PETERSENI* Appellöf.

Sepia peterseni APPELLÖF, Japanska Cephalopoder, 1886, p. 23, pl. 2, figs. 1-6. pl. 3, fig. 21.—WÜLKER, Doflein Beitr. Naturgesch. Ostasiens, 1910, p. 14.

Sepia (Doratosepion) peterseni BERRY, Japanese Cephalopoda, 1912, p. 423.—SASAKI, Annot. Zool. Japon., vol. 8, 1914, p. 618.

Station 4961 (Kii-suido). Two males. Cat. No. 332845, U.S.N.M.

Station 4963 (Kii-suido). Two males. Cat. No. 332846, U.S.N.M.

The specimens from the station 4963 are both young, measuring 30 mm. and 41 mm. in mantle length, respectively. They differ from the adult in having a broader mantle and head, and much shorter arms, which measure only half the length of mantle or even shorter.

45. *SEPIA MISAKIENSIS* Wülker.

Sepia misakiensis WÜLKER, Doflein Beitr. Naturgesch. Ostasiens, 1910, p. 15, figs. 5, 6, 19, 22.

Sepia (Doratosepion) misakiensis BERRY, Japanese Cephalopoda, 1912, p. 424.—SASAKI, Annot. Zool. Japon., vol. 8, 1914, p. 617.

Station 4930 (south of Kiushiu). One male. Cat. No. 332838, U.S.N.M.

The specimen has a mantle length of 58 mm., and agrees well with Wülker's description.

46. *SEPIA KOBIEENSIS* Hoyle.

Sepia kobeensis HOYLE, Challenger Cephalopoda, 1886, p. 142, pl. 18, figs. 7-14.—APPELLÖF, Japanska Cephalopoder, 1886, p. 20, pl. 3, fig. 7.—ORTMANN, Japansche Cephalopoden, 1888, p. 654.

Sepia (Doratosepion) kobeensis BERRY, Japanese Cephalopoda 1912, p. 423.—SASAKI, Annot. Zool. Japon., vol. 8, 1914, p. 617.

Station 4874 (Krusenstern Strait). Six specimens. Cat. No. 332859, U.S.N.M.

Station 4876 (Krusenstern Strait). Two specimens. Cat. No. 332864, U.S.N.M.

Station 4883 (west of Amakusa, Kiushiu). One female. Cat. No. 332851, U.S.N.M.

Station 4884 (west of Amakusa, Kiushiu). Two specimens. Cat. No. 332856, U.S.N.M.

Station 4885 (west of Amakusa, Kiushiu). Two males and three females. Cat. No. 332852, U.S.N.M.

Station 4937 (near Satamisaki, Kiushiu). One specimen. Cat. No. 332854, U.S.N.M.

Station 4938 (near Satamisaki, Kiushiu). One male. Cat. No. 332855, U.S.N.M.

Station 4946 (mouth of Kagoshima Bay). Two specimens. Cat. No. 332860, U.S.N.M.

Station 5095 (Sagami Sea). Two males and females. Cat. No. 332858, U.S.N.M.

Tsuruga. One female. Cat. No. 332850, U.S.N.M.

Shimizu, Suruga Province. One female. Cat. No. 332853, U.S.N.M.

Akunc, Satsuma Province. One female. Cat. No. 332857 U.S.N.M.

The specimens from station 4946 agree very well with Hoyle's original description, the only discrepancies from this being that the longest arms are not the second pairs but the fourth, and that the fins extend straight to above the spine and do not pass on to the ventral surface of the mantle. The remaining specimens accord with Appellöf's description better than that of Hoyle's, especially in the structure of the gladius.

47. *SEPIA KOBIIENSIS*, var. *ALBATROSSI*, new variety.

Platc 26, figs. 2, 3.

Station 4875 (Krusenstern Strait). One mature male and two females. Cat. 332862, U.S.N.M.

Station 4878 (Krusenstern Strait). One female. Cat No. 332863, U.S.N.M.

Station 4931 (near Yakushima). One juv. female. Cat. No 332861, U.S.N.M.

This variety is separated from the typical form by the weaker hectocotylization, by the smaller size of spermatophores, by the more rounded contour of the posterior end of the gladius and by the parabolic curvature of the posterior rim of the inner cone. Measurements of type: dorsal length of mantle 34 mm.; breadth of mantle 14 mm.; maximum breadth of fins 2 mm.; length of first arms 13 mm.; of second arms 9 mm.; of third arms 8 mm.; of fourth arms 10 mm.; diameter of largest armsucker 0.4 mm.; of largest tentacular sucker 0.6 mm.; breadth of gladius 7 mm.

Type-locality.—Krusenstern Strait.

Type.—Cat. No. 332862a, U.S.N.M.

Division OEGOPSIDA d'Orbigny.

Family ENOPLOTEUTHIDAE Pfeffer.

Genus ENOPLOTEUTHIS d'Orbigny.

48. *ENOPLOTEUTHIS CHUNII* Ishikawa.

Enoploteuthis chunii ISHIKAWA, Journ. Coll. Agric. Tokyo, vol. 4, 1914, pp. 401-413. pls. 38-39.—SASAKI, Annot. Zool. Japan., vol. 9, 1916, p. 91.

Station 4957 (Bungo-suido, from stomach of fish). One male and female. Cat. No. 332945, U.S.N.M.

These specimens are largely mutilated, yet well reveal the characteristics of the species. It is of special interest to have found the species in the Bungo Strait, a locality widely separated from its home.

Genus *WATASENIA* Ishikawa.

49. *WATASENIA SCINTILLANS* (Berry).

Abrialiopsis scintillans BERRY, Nautilus, vol. 25, 1911, p. 93; Japanese Cephalopoda, 1912, p. 424, pls. 7, 8, and 9, figs. 1-6.

Watasenia scintillans ISHIKAWA, Zool. Anz., vol. 43, 1913, pp. 162, 336, 6 figs.—SASAKI, Journ. Coll. Agric. Sapporo, vol. 6, 1914, p. 75, pls. 1, 2; Annot. Zool. Japon., vol. 9, 1916, p. 94.

Station 4829 (east of Noto Peninsula). Arms of a male. Cat. No. 332895, U.S.N.M.

Station 4855 (near Cape Clonard, Korea). One female. Cat. No. 332896, U.S.N.M.

Station 4856 (near Cape Clonard, Korea). Five females. Cat. No. 332897, U.S.N.M.

Station 4867 (near Cape Clonard, Korea). One female. Cat. No. 332899, U.S.N.M.

Station 4859 (near Cape Clonard, Korea). Three females. Cat. No. 332898, U.S.N.M.

Station 5048 (off Kinka-san, Rikuzen). One female and two males. Cat. No. 332900, U.S.N.M.

Station 5049 (off Kinka-san, Rikuzen). One female. Cat. No. 332901, U.S.N.M.

These specimens are all sexually mature except one from station 5048, which is a young male of 28 mm. mantle length. The female specimens measure 48-60 mm. in mantle length, and all bear spermatophores fixed at the nape.

Subfamily ANCISTROCHIRINAE Pfeffer.

Genus *THELIDIOTEUTHIS* Pfeffer.

50. *THELIDIOTEUTHIS ALESSANDRINI* (Verany).

Loligo alessandrini VERANY, Céphalopodes Méditerranéens, 1851, p. 99, pl. 35, figs. f-h.

Thelidioteuthis alessandrini CHUN, Tiefsee-Exp. Oegopsida, 1910, p. 104, pl. 7, figs. 16, 17.—PFEFFER, Plankton-Exp. Cephalopoda, 1912, p. 178, pl. 18, figs. 1-29.

Station 4960 (Hyuga-nada). One specimen. Cat. No. 332936, U.S.N.M.

This specimen is preserved in an excellent condition, and its mantle measures 26 mm. in length. It differs from Pfeffer's description in the smooth neck, in the roughly ovate whole outline of the fins, and in having seven ribs, projections and connectives of the buccal membrane. Furthermore, it has innumerable minute photo-

phores of zonary arrangement on the ventral surface, a fact not mentioned by Pfeffer nor by other writers, but which seems to be an important character of this species.

Subfamily HISTIOTEUTHIDAE Verrill.

Genus STIGMATOTEUTHIS Pfeffer.

51. (?) STIGMATOTEUTHIS DOFLEINI Pfeffer.

- Calliteuthis reversa* CHUN, Zool. Anz., vol 29, 1906, pp. 747, 751, 752, figs. 2, 4, 5.
Calliteuthis ocellata CHUN, Tiefsee-Exp. Oegopsida, 1910, pp. 152, 155, 156, 157, 158, 161, 162, 164, 165, 167, 170, textfigs. 22, 23; text-pl. 1, figs. 1, 2.
Stigmatoteuthis dofleini PFEFFER, Plankton-Exp. Cephalopoda, 1912, p. 288.

Station 5082 (Totomi Province). An imperfect specimen. Cat. No. 332939, U.S.N.M.

The above specimen consists of fragments of three arms belonging to an individual which is with doubt referred to this species. The arms are probably the first, second, and third ones of the left side. The series of the larger luminous organs is present in every arm but that of the smaller ones is not discernible in any, probably due to the great maceration of the skin. The suckers are comparatively well preserved, and their horny ring has broad roughly quadrangular teeth closely set on the distal half, these number 10 or 11 in larger suckers. The third arm shows a distinct subtriangular keel on the back near the middle. The color is claret throughout and much deeper on the sucker-bearing surface.

Family GONATIDAE Hoyle, emendation.

Genus GONATUS Gray.

52. GONATUS FABRICII (Lichtenstein).

- Gonatus fabricii* STEENSTRUP, Overs. Danske Vid. Selsk. Forth., 1881, p. 9, pl. 1.—VERRILL, U.S. Fish. Comm. Report, 1882, p. 289, pl. 15, figs. 1-1c, 2-2d.—HOYLE, Proc. Zool. Soc., 1889, pp. 117-135, pls. 13, 14.—PFEFFER, Plankton-Exp. Cephalopoda, p. 230, pl. 15, figs. 17-22.

Station 4760 (South of Alaska). One juv. Cat. No. 332911, U.S.N.M.

Station 4763 (near Commandorski). One juv. Cat. No. 332912, U.S.N.M.

Station 4765 (near Near Island, Aleutians). One juv. Cat. No. 332913, U.S.N.M.

Station 4793 (east of Kamtchatcha). Four juv. Cat. No. 332917, U.S.N.M.

Station 4769 (Bering Sea). One juv. Cat. No. 332914, U.S.N.M.

Station 4772 (Bering Sea). One male Cat. No. 332915, U.S.N.M.

Station 4775 (Bering Sea). Two juv. Cat. No. 332916, U.S.N.M.

Milne Bay, Simushir (from stomach of a Gull). Only arms. Cat. No. 332910, U.S.N.M.

The specimen from station 4769 is young of 40 mm. mantle-length. It differs from the similar-sized specimens hitherto described in having much longer arms and a head of more primitive structural type.

The specimens from the stations 4760, 4763, 4765, 4793, 4775, 4805, are all quite young, measuring 4-14 mm. in mantle length. Their external appearance recalls very much that of a cranchiid. Their mantle is barrel-shaped, semitransparent and somewhat membranous, showing a part of the gladius along the mid-dorsal line of mantle. The fins are minute, semicircular, attached to the extreme end of the body. The head is always deeply contracted into the mantle cavity, more or less prismatic and bears projecting eyes. The equipment of the arms consists of suckers placed in four rows; that of the tentacles is also composed of suckers, which extend nearly the whole length of the tentacles, arranged biserially at the base, quadriserially near the middle and octoserially at the extremity.

53. GONATUS MAGISTER Berry.

Gonatus fabricii (?) BERRY, Bull. Bureau Fish., vol. 30, 1912, p. 310, pl. 52, figs. 1, 2; pl. 53; pl. 54, figs. 1-4; pl. 55, figs. 1, 3-7.

Gonatus magister BERRY, Proc. Acad. Nat. Sci. Philadelphia, 1913, p. 76.—
SASAKI, Annot. Zool. Japon., vol. 9, 1916, p. 97.

Station 4774 (near Bowers Bank, Bering Sea; from Stomach of *Albatrossia pectoralis*). One young female. Cat. No. 332907, U.S.N.M.

Station 4853 (near Cape Clonard, Korea). One female. Cat. No. 332908, U.S.N.M.

Station 4983 (off Yuwanai, Hokkaido). One male. Cat. No. 332909, U.S.N.M.

These specimens agree well with Berry's description. The specimen from the station 4774 is a young of 82 mm. mantle length. It has only four hooks on the first arm, eight hooks on the second and also on the third. The suckers of the two median rows are comparatively large, attaining twice (or more), the diameter of those of the outer rows.

GONATOPSIS, new genus.

The characters of this genus are the same as those given in the description of the type species.

Type of the Genus—*Gonatopsis octopedatus*.

54. GONATOPSIS OCTOPEDATUS, new species.

Plate 26, fig. 5.

Station 5029 (near Capo Patience, Sakhalin). One specimen. Cat. No. 332918, U.S.N.M.

Consistency rather soft. Body elongated, thrice as long as wide, the broadest part being one-third the length from the anterior end,

and then tapering off caudad. Fins terminal, both together of kidney-shape, deeply indented at the anterior attachment; their total breadth far greater than their length which is in turn about three and a half times the length of body.

Head a little narrower than body. Eye-opening wide, with a deep sinus a little below the middle of the anterior margin, Funnel groove ill-defined. Nuchal cartilage elongated, very slightly widening cephalad. Funnel short, deeply contracted. Funnel organ composed of one \wedge -shaped dorsal pad and two oval ventral pads. Funnel cartilage nearly lanceolate, with the sharper end anteriorly; locking groove narrow throughout, extending the whole length of the cartilage.

Arms subequal, the formula of length being $2 > 3 > 1 = 4$, the longest being five-sixths the length of body. All comparatively rapidly tapered in the proximal two-thirds, the remaining one-third somewhat characteristically attenuated but terminating in a comparatively blunt extremity. Armatures in the proximal two-thirds, quadriserial, consisting of two outer rows of minute suckers and two inner rows of relatively large hooks; in the distal one-third, they are composed of minute suckers arranged in 8-12 series. This is, however, exceptional for the ventral arms, where the armatures are all composed of suckers only.

Tentacles absent. Buccal membrane relatively broad, with seven marginal projections.

Total length 130 mm.; dorsal length of body 65 mm.; maximum breadth of body 22 mm.; length of first right arm 45 mm.; of second arm 55 mm.; of third arm 52 mm.; of fourth arm 53 mm.

Type.—Cat. No. 332918, U.S.N.M.

Family OMMASTREPHIDAE Gill.

Subfamily OMMASTREPHINAE Carus.

Genus OMMASTREPHEs d'Orbigny.

55. OMMASTREPHEs SLOANI PACIFICUS (Steenstrup).

Todarodes pacificus STEENSTRUP, Overs. Danske Vid. Selsk. Fotr., 1880, pp. 83, 90, etc., 1 fig.—HOYLE, *Challenger* Cephalopoda, 1886, pp. 34, 163, pl. 28, figs. 1-5.—Joubin, Bull. Soc. Zool. France. 22, 1897, p. 103.

Ommastrephes pacificus APPELLÖF, Japanska Cephalopoder, 1886, p. 35, pl. 3, figs. 8-10.

Ommastrephes sloani BERRY, Japanese Cephalopoda, 1912, p. 433, pl. 6, fig. 4.

Ommatostrephes sloani pacificus PFEFFER, Plankton-Exp. Cephalopoda, 1912, p. 456, pl. 34, figs. 3-6.

Hakodate market. One juv. Cat. No. 332932, U.S.N.M.

Sado Island. One juv. Cat. No. 332933, U.S.N.M.

Station Ebisu market, Sado Island. Three females and one male. Cat. No. 332930, U.S.N.M.

Station 4845 (near Oki Island, Krusenstern Strait). Eight juv.

Station 4852 (east coast of Korea; from the stomach of a Raja).
One female. Cat. No. 332931, U.S.N.M.

Station 4855 (near Cape Clonard, Korea). One female. Cat. No.
332929, U.S.N.M.

Station 4952 (east of Osumi). Three juv. Cat. No. 332934,
U.S.N.M.

The specimens from the station 4952 are referred with hesitation to the present species. They are young specimens of 6—7.7 mm. mantle length, and have longer tentacles and more developed but smaller eyes than the other specimens of the same size.

Family CHIROTEUTHIDAE Gray.

Subfamily CHIROTEUTHINAE Chun.

Genus CHIROTEUTHIS d'Orbigny.

Subgenus CHIROTHAUMA Chun.

56. CHIROTEUTHIS (CHIROTHAUMA) IMPERATOR Chun.

Chiroteuthis (Chirothauma) imperator CHUN, Tiefsee-exped. Oegopsida, 1910, pp. 240, 241, 281, pl. 33, figs. 1-10; pl. 40, figs. 2-5, 7; pl. 41; pl. 42, figs. 1-4; pl. 43; pl. 44, figs. 3, 6-16.—PFEFFER, Plankton-exped. Cephalopoda, 1912, p. 581.

Station 4906 (near Koshiki Island, Satusma Province). One specimen. Cat. No. 332937, U.S.N.M.

Station 4951 (off Osumi Province). One specimen. Cat. No. 332938, U.S.N.M.

Genus MASTIGOTEUTHIS Verrill.

57. MASTIGOTEUTHIS CORDIFORMIS Chun.

Mastigoteuthis cordiformis CHUN, Zool. Anz., vol. 33, 1908, p. 88.—CHUN, Tiefsee-exped. Oegopsida, 1910, p. 222, pl. 34; pl. 35, figs. 1, 5, 6, 10-14; pl. 36, figs. 3-5; pl. 37, fig. 5.—PFEFFER, Plankton-exped. Cephalopoda, 1912, p. 613.

Station 5060 (Suruga Bay). One specimen. Cat. No. 332947, U.S.N.M.

This specimen is 90 mm. in mantle length, being a little larger than the type. It differs from Chun's description at least in having fainter antitragus of the funnel cartilage, more numerous teeth in arm-suckers, and shorter and less recurved teeth in tentacular suckers.

Family CRANCHIIDAE Prosch.

Genus GALITEUTHIS Joubin.

58. GALITEUTHIS ARMATA Joubin.

Galiteuthis armata JOUBIN, Ann. Sci. Nat., vol. 6, 1898, pp. 279, 292, figs. 1-9.—PFEFFER, Plankton-exped. Cephalopoda, 1912, pp. 731-736.

Station 4768 (Bering Sea). One specimen. Cat. No. 332926, U.S.N.M.

Station 4797 (Starichkof Island, Kamchatka). One specimen. Cat. No. 332927, U.S.N.M.

Of the two specimens listed above the first is an adult of 270 mm. mantle length and the second is a young of 109 mm. mantle length. The former specimen is far larger than the original and differs in many respects from Joubin's description. The head is small, being far narrower than the body and resembles at a glance that of the higher oegopsids. It is a roughly three-sided prism, one side represented by the dorsal surface, and the other two by the lateral surfaces. The dorsal surface is not evenly flat but depressed in the middle, the depression defined behind by a prominent nape. The ventral surface is represented merely by an edge of the prism although it is not sharply brought to an angle. It has a groove along its crest, marked off by stiff ridges from the lateral surfaces. The groove widens posteriorly, where it is occupied by a large bundle of the funnel adductors so that it shows no real concavity. The eyes are extensively covered with the eyelids, the eye-openings being small, and triangular. The protective membranes are largely obliterated between the trabeculae, so that these are converted into slender cirriform appendages which much recall the cirri of the Cirroteuthidae.

Genus TAONIUS Steenstrup.

59. TAONIUS PAVO (Lesueur).

Loligopsis pavo FÉRUSSAC and D'ORBIGNY, Céphalopodes acétabulifères, 1839, p. 321, Calmars, pl. 6, figs. 1-3a, b; *Loligopsis*, pl. 6, figs. 1-3 (5, 5bis, 6).

Taonius pavo JOUBIN, *Princess Alice* Cephalopoda, 1900, p. 106, pls. 8, 9, pl. 10, figs. 7-9; pl. 15, fig. 16.—PFEFFER, Nordisches Plankton, 1908, p. 102, figs. 117, 118; Plankton-exped. Cephalopoda, 1912, p. 704.

Station 4906 (near Koshiki Island, Kiushiu). Two females. Cat. No. 332946, U.S.N.M.

These two specimens measure 330 mm. and 179 mm. in mantle length respectively and well agree with Joubin's description.

Genus MEGALOCRANCHIA Pfeffer.

60. MEGALOCRANCHIA MAXIMA Pfeffer.

Megalocranchia maxima PFEFFER, Abhandl. Naturwiss. Vereins, Hamburg, vol. 8 (pt. 1), 1884, p. 24, figs. 32, 32a; Plankton-exped. Cephalopoda, 1912, p. 712, pl. 48, figs. 1-4.

Station 4917 (west of Oshima Group, Kiushiu). One specimen. Cat. No. 332928, U.S.N.M.

This specimen is larger than the type, measuring 63 mm. in mantle length. Disagreeing with Pfeffer's description, the fins are only little auriculated in the anterior origin, and the protective membrane is obliterated between the trabeculae at the distal parts of arms.

Genus *CRYSTALLOTEUTHIS* Chun, emendation.61. *CRYSTALLOTEUTHIS BERINGIANA*, new species.

Plate 26, fig. 4.

Station 4765 (Aleutian Islands). One specimen. Cat. No. 332920, U.S.N.M.

Station 4783 (Attu Island, Aleutian Islands). One specimen. Cat. No. 332921, U.S.N.M.

Station 4793 (Avacha Bay, Kamchatka). Two specimens. Cat. No. 332919, U.S.N.M.

Station 4806 (east of Erimo-saki, Hokkaido). One specimen. Cat. No. 332922, U.S.N.M.

Station 5030 (southern part of Okhotsk Sea). One specimen. Cat. No. 332923, U.S.N.M.

Body subfusiform, about one-third as broad as long, broadest a little before the middle, acuminate posteriorly. A single bifid crystalline tubercle is present on either side of the ventral margin of the mantle but none at its dorsal margin. Fins terminal, small; their combined outline shield-shaped; the total breadth slightly greater than the length which is in turn about one-ninth the length of mantle.

Head small, prismatic. Eyes nearly mallet-shaped, with swollen peduncles. Eye-ball of a rounded lozenge shape in contour, the ventral extremity somewhat prominent though not rostrated, and covered over by a single large semilunar photophore. Dorsal pad of funnel organ roughly quadrilateral, two-thirds as deep as broad, bearing a long stiff process at the center; ventral pads rounded-quadrangular, about half as broad as the preceding pad.

Arms nearly conical, without carination; dorsal pair decidedly shorter than the others which are of about equal length and a little shorter than one-third the length of the body. Umbrella quite rudimentary. Suckers closely set in two rows, numbering about ten pairs on the dorsal arm and twelve or thirteen pairs on each of the remaining arms; horny ring with 5-7, narrow, blunt teeth along the distal margin.

Tentacles about twice as thick, and four or five times as long, as the arms. Club obscurely marked off from the stem, only a little expanded; aboral surface rounded, without dorsal web. Club suckers closely quadriserial, numbering about 45, subequal but the central ten or twelve somewhat larger than the others; horny ring almost as in arm-suckers. Stem suckers minute, sparsely biserial, numbering about 35.

Gladius extending the whole dorsal length of the mantle, very narrow, but a little expanded posteriorly into a slender lanceola.

Stomach with a single constriction near its caecum which is ovoidal and $\frac{1}{4}$ - $\frac{1}{2}$ as long as the stomach. Pancreas massive, lying on the ventral aspect of liver. Bile-ducts connected with pancreas near their

exits from the liver and then united together, thus forming a Y-shaped hepato-pancreatic duct.

Measurements of type: length of body 27 mm.; breadth of body 9.2 mm.; length of fins 3 mm.; total breadth of fins 4 mm.; length of second arm 2.3 mm.; length of tentacles 13 mm.

Type locality.—Attu Island, Aleutian Islands.

Type.—Cat. No. 332921, U.S.N.M.

Subfamily CRANCHIINAE Pfeffer.

Genus LIOCRANCHIA Pfeffer.

62. LIOCRANCHIA VALDIVIAE Chun.

Liocranchia valdiviae CHUN, Zool. Anz., vol. 31, 1906, p. 84; Tiefsee-exped. Oegopsida, 1910, p. 337, pl. 48, figs. 3, 4; pl. 51, figs. 1-4, 8-14; pl. 60, figs. 7-11.—PFEFFER, Plankton-exped. Cephalopoda, 1912, p. 675.

Station 4970 (off Kii Province). One mature female. Cat. No. 332925, U.S.N.M.

This specimen is much larger than the type, measuring 63 mm. in mantle length. It deviates from Chun's description in having more numerous tubercles on the hyaline streaks of the mantle, and longer arms, the order of which is 3, 4, 2, 1, instead of 3, 2, 4, 1. Further, the arms and tentacles both have more suckers, and the connective suckers of the tentacles are accompanied with fixing pads not only at the carpal region, but throughout the entire series.

EXPLANATION OF PLATES.

PLATE 23.

- FIG. 1. *Watasella nigra*. Dorsal view. $\times 3$.
 2. *Stauroteuthis albatrossi*. Hectocotyized arms. Natural size.
 3. *Stauroteuthis albatrossi*. Dorsal cartilage. Natural size.
 4. *Polypus tsugarensis*. Funnel laid open. $\times 2$.
 5. *Polypus pustulosus*. Funnel laid open. Natural size.

PLATE 24.

- FIG. 1. *Polypus spinosus*. Funnel laid open. $\times 2$.
 2. *Polypus yendoi*. Funnel laid open. Natural size.
 3. *Polypus validus*. Hectocotylus. $\times 2$.
 4. *Polypus alatus*. Male internal genital organs. *a. sp.* accessory spermatophoric gland. *N.* Needham's sac. *p.* penis. *sd.* spermiduct. *sp.* spermatophoric gland. Natural size.
 5. *Polypus tenuipulvinus*. Funnel laid open. $\times 2$.

PLATE 25.

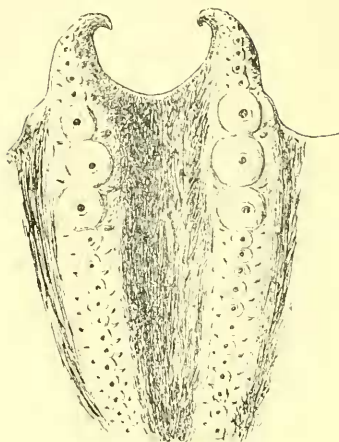
- FIG. 1. *Rossia mollicella*. Arms. *h.* hectocotyized arm. $\times 1\frac{1}{2}$.
 2. *Sepia carinata*. *A.* Dorsal aspect of shell. $\times 3$.
 3. *Rossia bipapillata*. Funnel laid open. $\times 5$.

PLATE 26.

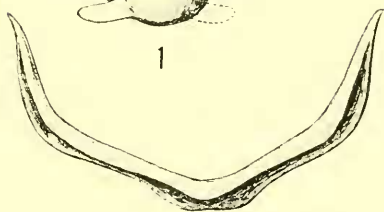
- FIG. 1. *Sepia carinata*. Ventral aspect of posterior part. $\times 6$.
 2. *Sepia kubiensis*, var. *albatrossi*. Ventro-lateral view of posterior part. $\times 5$.
 3. *Sepia kubiensis*, var. *albatrossi*. Ventral aspect of shell. $\times 2$.
 4. *Crystalloteuthis beringiana*. Ventro-lateral view of head and arms. $\times 6$.
 5. *Gonatopsis octopedatus*. Ventral view. Natural size.



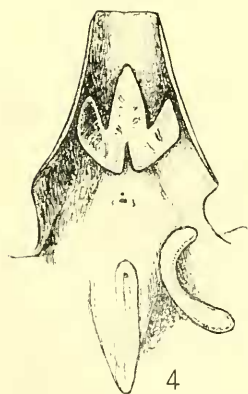
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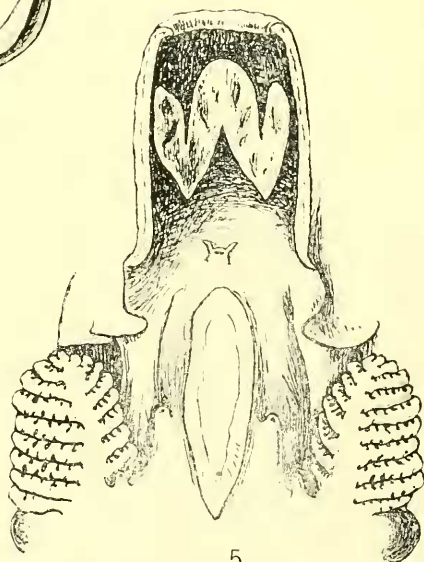
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3



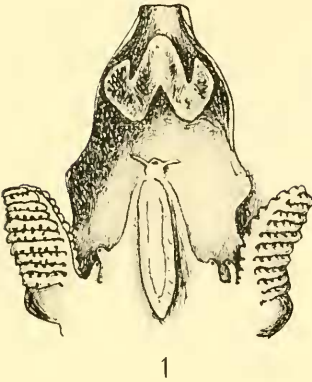
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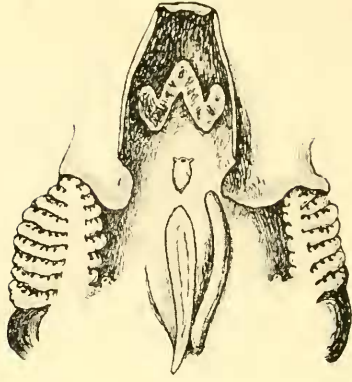
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NEW CEPHALOPODS FROM THE NORTHWESTERN PACIFIC.

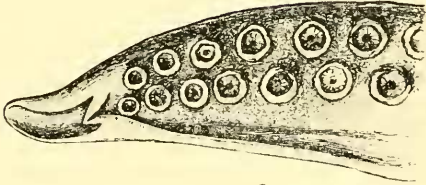
FOR EXPLANATION OF PLATE SEE PAGE 203.



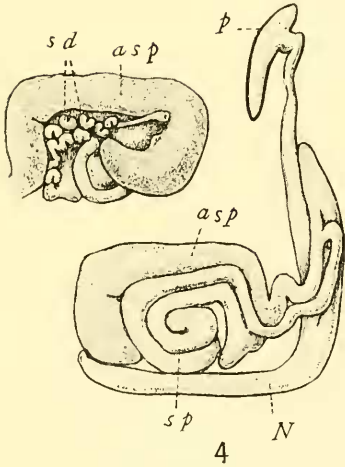
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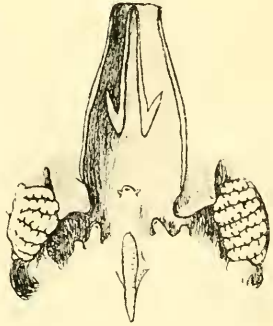
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3



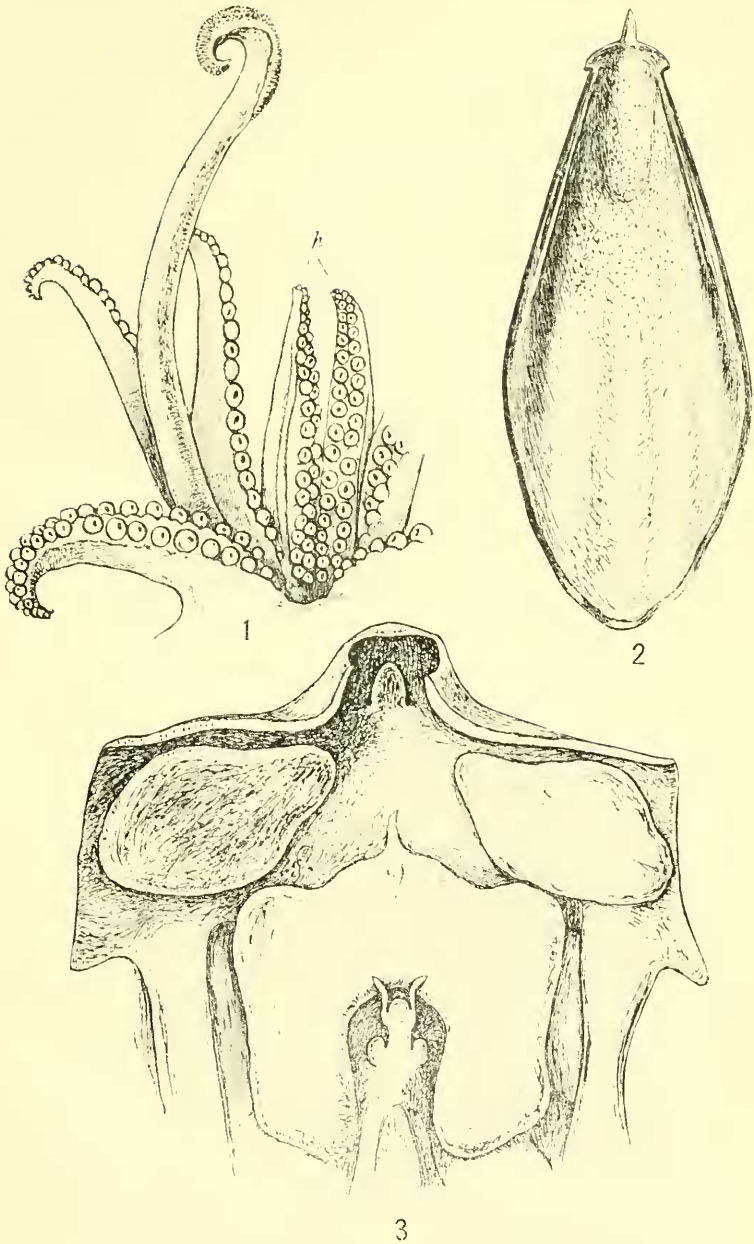
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5

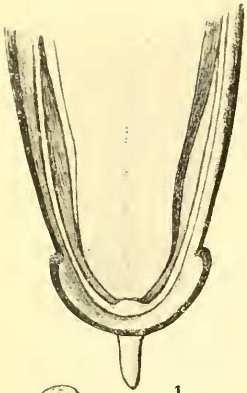
NEW CEPHALOPODS FROM THE NORTHWESTERN PACIFIC.

FOR EXPLANATION OF PLATE SEE PAGE 203.



NEW CEPHALOPODS FROM THE NORTHWESTERN PACIFIC.

FOR EXPLANATION OF PLATE SEE PAGE 203.



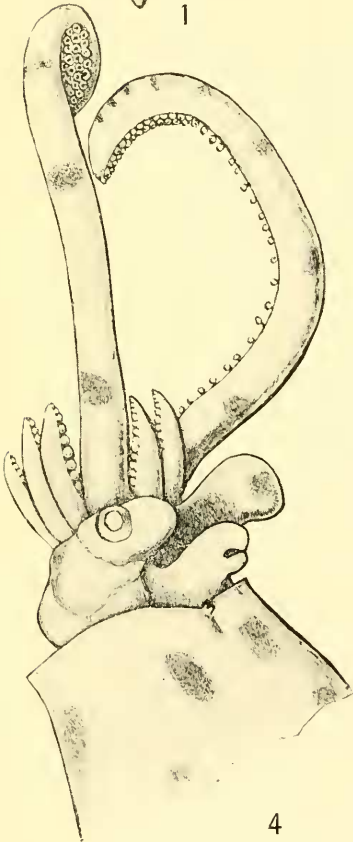
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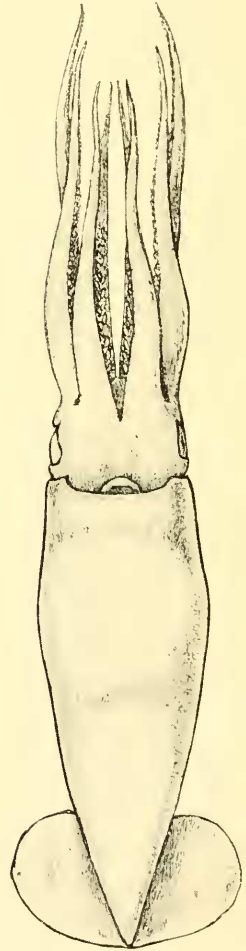
2



3



4



5

NEW CEPHALOPODS FROM THE NORTHWESTERN PACIFIC.

FOR EXPLANATION OF PLATE SEE PAGE 203.